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THE PRACTICAL TEACHER

"THE HALF-TIMER."

Statuette presented to Mr. Rich. Waddington, Ex-President of N.U.T.

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·VOL· XIX No. II

EDITORIAL, PUBLISHING AND ADVERTISING OFFICES OF "THE PRACTICAL TEACHER" 33 PATERNOSTER ROW, LONDON, E.C. — NEW YORK OFFICE, 37 EAST EIGHTEENTH STREET.

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A MONTHLY MAGAZINE AND REVIEW FOR THE SCHOOL-ROOM AND THE STUDY

Vol. XIX. No. 11. MAY, 1899. Price 6d.

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All literary communications should be addressed:—
Office of "THE PRACTICAL TEACHER,"
33 Paternoster Row, LONDON, E.C.

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A RETROSPECT OF CONFERENCE.

BY

THE SILENT MEMBER.

ABOVE a confused memory of angry disputation and delectable junketing a gentle regret alone remains as the permanent legacy of a week's sojourn in stately Granta. Of all who came and saw scarce one departed without a little pang, without an inspired vision of what might have been. Would that it had fallen to our lot to enter at the Gate of Humility, to approach the Gate of Wisdom, and to leave by the Gate of Honour with a mind attuned to the reverence of study for its own sake, and a youth ennobled by contact with the soul-stirring traditions that every ancient tower and hall seem to exhale like a perfume! Would that it had been our lot to wear the gown in courts trodden by the long and glorious line of poets, philosophers, statesmen, historians, soldiers, scholars, and divines who have left the impress of their genius on the nation's story! What might we not have been?

GATEWAY OF ST. JOHN'S COLLEGE.

* * * * * *

Nor is our regret lessened when we meet one who is revisiting his *alma mater*. How his cheeks flush and his eyes glow as he passes "up that long walk of limes.....to see the rooms in which he dwelt." What suppressed excitement as he ushers us into the chambers he occupied some half a score years ago. And then the flood-gates of reminiscence are opened, and, alack! the spell is broken. Where are the chastened recollections of high thought, of noble converse, of daily inspiration? Where indeed? The story is a wild medley of "bumps," "wines," "gatings," hairbreadth escapes from wily proctors, and nightly "ragging" expeditions—an entrancing but sadly unintellectual recital. And then an uncomfortable conviction begins to grow upon us that, in all probability, this too would have been our record. Thereat our regret is a little modified, and we begin to understand that Cambridge only gives of her best to that happy few who seek her gifts as the Arthurian knights sought the Holy Grail.

* * * * * *

The members of Conference began to arrive, not as single spies, but in battalions, on Saturday morning. They crowded the narrow Petty Cury until it resembled the queue of a Strand theatre, and stood in animated handshaking groups on the imperceptible Market *Hill* whereon the Guildhall—the Conference Hall—stands. Inside the reception room there was a cordial welcome for everybody; indeed, one cannot recall a body of Conference officials more eagerly desirous of affording the stranger a home from home, or more successful in their friendly efforts. The rest of the day was devoted to the entrancing work of sight-seeing; and in the evening old friends fell on one another's necks in many a smoke-room, what time the blessed incense of St. Nicotine rolled aloft in mighty cloud.

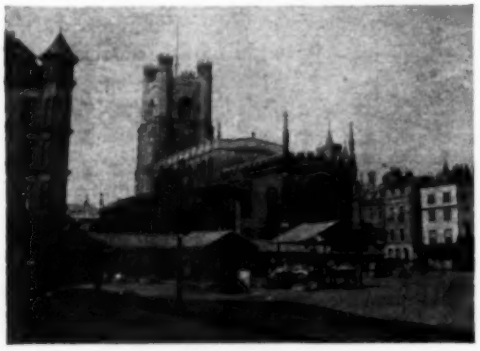
* * * * * *

Sunday one recalls as a blessed day, with a delightful morning service in the Chapel of Trinity, and an exquisite musical treat in the afternoon at world-famed "King's."

Like the late Laureate, we

> "Heard once more in college fanes
> The storm their high-built organs make,
> And thunder-music, rolling, shake
> The prophet blazoned on the panes."

One can only rhapsodise on King's—on the lordly architecture that bursts into a very flower of heraldic device and delicate tracery, on the carved oak, the gilding, the pictures,



GREAT ST. MARY.

the ancient brasses, and the setting sun that shot a rainbow gleam through the jewelled windows like a parting benison from heaven. A day to cherish indeed.

* * * * * *

A gay holiday crowd crammed the Guildhall on Monday afternoon, when Dr. Hill, the Vice-Chancellor, in his plain velvet robe, took the chair to bid Conference welcome on behalf of the University. One felt, as one looked at the finely-chiselled face of the Vice-Chancellor, and listened to the polished periods of his address, that here was an ideal representative of that university spirit which, it was hoped, we might catch in some faint degree during our visit to Cambridge. "It was difficult to say what they meant when they used that favourite expression. It was easier to say what they wished to exclude. They wished to exclude every object which was sordid, or time-serving, or narrow in its scope—to signify the pursuit of knowledge, not as a commerce, but as a cult.

> 'And only the Master shall praise us,
> And only the Master shall blame;
> And no one shall work for money,
> And no one shall work for fame.'"

The Vice-Chancellor welcomed us as brothers, as fellow-members of the great teaching profession—a profession which included all who taught, from the teacher of an infant school to Adams, Caley, Seeley, and Maitland. Truly a generous and noble deliverance, which was greeted with ringing cheers

THE BRIDGE OF SIGHS.

by a delighted audience. Other words of welcome followed from the Mayor and the Dean of Corpus Christi; and Mr. Waddington and Mr. Wild, each according to his wont, expressed the thanks of Conference for the university and civic welcome so heartily vouchsafed. These amenities concluded, the thirtieth Conference immediately got under way.

* * * * * *

Dr. Macnamara's tribute of thanks to the retiring President was as full of generosity and enthusiasm as it well could be, and was rounded off with a pleasing little presentation in the form of an admirable statuette of "The Half-Timer," modelled by Mr. Earthrowl, an art master under the London School Board. (A photograph of the study appears on the cover of THE PRACTICAL TEACHER for this month.) Mr. Waddington, "the Wilberforce of the child factory slave," replied with emotion, Mr. Clancy was introduced, and representatives settled themselves afresh in their seats for the presidential address.

* * * * * *

No doubt most of my readers have read Mr. Clancy's lucubration elsewhere. It dwelt, of course, with qualified gratitude, on the Superannuation Act of last session, and congratulated the retiring President on the splendid majority cast in favour of Mr. Robson's Half-time Bill. It said all that it was expected to say on the question of insecurity of tenure, and pleaded for a codal clause that no teacher should be dismissed except for some just and assigned cause. After a reference to the "criminal apathy" of the country in the

ON THE WAY TO THE CONFERENCE HALL.

matter of compulsory attendance and short school life, it passed on to what seemed to me an ill-timed pronouncement on the question of definite doctrinal instruction. The employment of the unqualified practitioner was severely animadverted upon, and the address concluded with a peroration setting forth the mission of the teacher. Mr. Clancy, like several of his predecessors in the chair, was handicapped in having to deliver a written address. Few men have the faculty of importing an air of spontaneity into the delivery of a carefully-prepared paper. One could wish that our presidents—most of whom are practised public speakers—would draw up a *précis* of their points for the press, and then address Conference out of the fullness of their hearts. If they would do this, there would be an end to the exodus of the "old hands" immediately the presidential address is announced.

* * * * * *

The foreign deputations, I thought, acquitted themselves admirably. Scotland—happily the tomahawk is now buried—led off in the person of Mr. Thompson, President of the E.I.S., who was decidedly humorous in claiming for his association the frosty virtue which Jonathan Oldbuck claimed for his sisters—the virtue of antiquity. Ireland sent Mr. Gamble, who said his say well. Then followed M. Desmedt,

BRITISH MUSEUM

who touched a funereal note in referring to the late Mr. Addiscott as one "who devoted a noble and patriotic life to the cause of education and to the service of the children." M. Burniat, on behalf of the Belgian teachers, added a further graceful reference to the life-work of our departed friend; and M. Van Dam of Rotterdam, speaking for his unpronounceable association in Holland, made Conference hold both its sides. Miss Webb, on behalf of the Co-operators, brought up the rear; and when Mr. Jackman's election as Vice-President had been announced, everybody hurried away to snatch a hasty meal preparatory to the excitements of an eagerly-anticipated private session, timed to commence one hour later.

* * * * * *

Distrust was in the air. The Jeffries scandal had created a deep-seated suspicion, and the report of the examiners of accounts had sent many statistical members to the detailed balance-sheet in the spirit of Sherlock Holmes. The session —the first evening session ever held at Conference—was one over which most representatives would be glad to draw a veil. Innuendoes and suggestions of malversation flew about wholesale, and Conference was little better than a bear garden. Possibly the air is now cleared, but the process was a wretched business while it lasted. The fact is that Conference has grown far too unwieldy for anything but public demonstrations. It is absurd to expect seventeen hundred people to

THE CONFERENCE HALL.

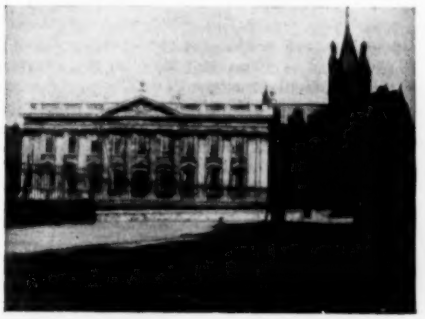
calmly and judicially pronounce an opinion on matters of detail. We shall have to reform the whole system. Probably we shall find it advantageous to retain the Easter Conference for purely educational meetings, and agree to refer our domestic affairs to a small elective body meeting in London at the close of the year. It was a blessed relief to slip away from the rancour of the Guildhall to the serener air of Newnham—sacred to awesome ladies who grapple with Greek elegiacs and the differential calculus, but given over on the present occasion to charming music, light refreshments, and happy speech-making.

* * * * * *

Tuesday, to me, was the most satisfying day of the whole week—indeed, it was *the* educational day. After the city fathers of York had offered a cordial invitation to us to meet within their hospitable walls next year, and had retired with our delighted acceptance, we heard Mrs. Sophie Bryant expound with infinite skill and charming moderation the claim of women as teachers. Then an interlude on the inspection of infant schools followed, and the Conference roared over a series of ludicrous reports on the work of the lower babies. We knew those reports; they came from Leeds. Professor Jebb's masterly plea for the unity of education, delivered with all the classic grace associated with his name, came next; and we finished the morning with an excursion into those educational politics which some of our leaders find so fascinating, but which, I am convinced, the average member of Conference sets down as mere leather and prunella.

* * * * * *

The Senate House function—the crowning function of Con-



THE SENATE HOUSE.

ference—was especially pleasing. Floor and gallery were filled with an expectant crowd, somewhat subdued, perhaps, by the formal gravity of their novel surroundings, but, nevertheless, glowing with a very real satisfaction at the honour about to be paid vicariously to every member of the N.U.T. Scarlet-gowned doctors strolled in; the new M.A.'s arrived, wearing their robes with a grace, and vainly endeavouring to conceal their very pardonable pride; the Registrar, with his great brass-bound roll of honour, took his place; the ushers called "Silence!" and we got upon our legs to greet the Vice-Chancellor. Preceded by the Esquire Bedells, carrying what the irreverent undergraduate terms "pokers," Dr. Hill advanced to the gilded chair of honour, looking for all the world like an ancient picture of a dead and gone Justiciar of William the Norman's day. Then Professor Jebb, in a perfect piece of sonorous Latinity, lauded the N.U.T., proclaimed the virtues of our President and General Secretary, and presented each in turn for the degree of Master of Arts. The Latin formulas were pronounced, we duly cheered the lucky recipients, the Senate was dissolved in a sentence, and the procession filed out to the noble Fitzwilliam Museum, where the Vice-Chancellor and Mrs. Hill were "At Home" to every member of Conference.

* * * * *

The Conference dinner in the magnificent hall of Trinity—the hall of Tennyson, Carlyle, Maurice, and Ruskin—wound up the day. Dinner in such lordly surroundings almost rose to the level of an act of worship. Seven centuries of tradition seemed focussed in the place, and wherever

THE HALL OF TRINITY.

the eye rested amidst the sumptuous carving and gilding, the portrait of a king of men looked down upon the animated

throng. The venerable Master of Trinity made *the* speech of the evening in proposing the toast of the N.U.T.—a gracious and graceful address which will long live in the memory. By the way, the ladies were especially honoured in being permitted to dine in the hall. Only once before, I understand, has a lady dined within its precincts, that lady being Her Majesty the Queen.

* * * * * *

The sun shone out on Wednesday morning and seduced many representatives from the path of duty. They were discussing Dr. Macnamara's resolution on the popular control of education, and the Finsbury scheme, inside the Guildhall. Outside, many of us were visiting the colleges and strolling in the famous "backs." Reprehensible doubtless, but delightful certainly. Nor were we more eager for work in the afternoon. There was a boys' football match in aid

MR. J. W. ILIFFE, M.A.
Chairman Cambridge Conference Committee.

MR. F. CHANTLER, M.A.
Hon. Sec. Cambridge Conference Committee.

of the Charities, and that was quite a sufficient excuse for playing truant. It was perhaps a little ungrateful to be absent when the formal votes of thanks were moved to the local Conference officials, who had so ardently vied with one another during the week in promoting the comfort and convenience of the visitors. Few of us will readily forget the courtesy and consideration we received at the hands of Messrs. Iliffe and Chantler.

* * * * * *

After a day in the open air, we could not conscientiously do less than attend the private session in the evening. From the first one was glad to see that a revulsion of feeling had set in. The pettiness of many of the attacks on Executive expenditure had come home to the representatives, and altogether a healthier tone was evident. Mr. Peaker's defence of the "House of Lords" brought Mr. Hearn to his feet with an oration which must rank with the finest speeches ever heard in Conference. Powerful, restrained, polished, dramatic, it was a triumph of vindication, and worthy of any assembly in the world. Ultimately we passed the balance-sheet and went our way—some to the rural teachers' meeting, where Dr. Macnamara poured out the vials of his wrath on the national neglect of village education, and some to the splendid medley of entertainments provided at Homerton New College by the Principal, Mr. J. C. Horobin, M.A., and his indefatigable staff.

* * * * * *

Storm signals were flying when we met on Thursday morning to thrash out the deplorable question, Should the services of Mr. Jeffries be retained in connection with the Benevolent and Orphan Funds? Happily, the hurricanes of earlier sessions had almost blown themselves out. There were fierce gusts, of course, but, generally speaking, the atmospheric condition was distinctly calmer than most of us expected. The session was remarkable for the manner in which Conference threw over the recommendations of the Executive, and pointed out a simple and satisfactory solution of the whole problem—a solution which was so clear that one marvelled how the Executive came to miss it. No doubt Mr. Bowden's passionate indictment of Mr. Jeffries had its influence; but I thought the representatives, from the first moment of the session, had fully decided upon the course of action. It was a foregone conclusion that Mr. Jeffries should cease to have any connection with the Funds. It was equally certain that Conference would temper justice with mercy, and provide a post for him in another capacity. I suppose it was almost inevitable that there should have been a change in the treasurership, though it seemed not a little hard to throw over Mr. Devonshire after his almost lifelong service to the Funds.

A FINANCIAL CONCLAVE—MESSRS. HAMILTON, HEARN, AND BALDWIN.

* * *

I need not pause to recall the splendid Reception of Purses, or the capitally-organised and well-attended Ball. Both were feathers in the cap of Cambridge, and a direct challenge to our York friends. Friday was a churlish, wintry day—wet, bleak, detestable. Wise indeed were those who stayed in town to the morning session, and eschewed the temptations of what promised to be most attractive excursions. A large party shivered to Hatfield and back, and a hundred and fifty others made a pilgrimage by train and brake to Woburn Abbey. If anything could have mitigated the rigour of the weather, it would have been the princely hospitality dispensed to the latter party by the Duke of Bedford. I deeply sympathised with the members of the Excursion Committee. The Fates were against them.

The Friday morning session resulted, I was glad to learn, in the appointment of Mr. A. A. Thomas, B.A., as paid Secretary to the Examinations Board. The Union will have an able, hard-working, devoted servant in Mr. Thomas.

MR. MULLETT, M.A.
Chairman Excursion Committee.

* * * *

So Conference came to an end. It was a Conference of strange contrasts—on the one side, the great serenity, the calm aloofness, the gracious culture of an ancient seat of learning; on the other, the weary clamour of family jars. The one cannot readily fade from the memory. As for the other, we would pray, like Themistocles, for a talent of forgetting.

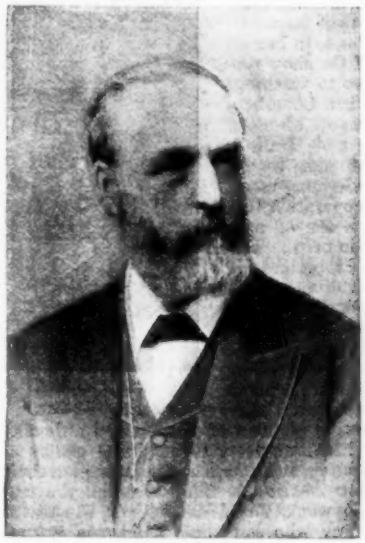
IMPRESSIONS OF CONFERENCE.

It is always instructive, if not always gratifying, "to see ourselves as others see us." We had, therefore, asked a number of delegates and visitors to furnish the readers of The Practical Teacher with their impressions of the recent Conference. For want of space we are compelled to limit our selection of impressions received to three—namely, those of Mr. J. G. Thompson, F.E.I.S., the President of the Educational Institute of Scotland, and MM. Gaillard and Desmedt (France). In inserting these, we take the opportunity of cordially thanking our correspondents for their ready and prompt response to our request.

SCOTLAND.

Mr. Thompson writes:—

"Asked as a Scotch delegate our impressions of the N.U.T. Cambridge Conference, we are inclined to throw up our hands in a fashion suitable to the windmill country of the Fens, and cry, like an ancient brother of ours, 'Pro-di-gi-ous!' The force, the fire, the fury our English brethren throw into their work is, to the calm, cold, cautious northerner, a revelation.



MR. J. G. THOMPSON, F.E.I.S.
President of the Educational Institute of Scotland.

What is it, we may well ask, gives to the southern teacher his rapidity of thought, his fluency of tongue, his vehemence of gesture? Is it the larger allowance he metes out for himself of roast-beef, of plum-pudding, or of bitter beer? Or is it due to climatic influence? Of course, England is midway between Scotland and France, but we think the Demosthenic power of Conference represents a position nearer our Gallic friends than ourselves. Had we shut our eyes on certain stages of the proceedings, we could have fancied ourselves in Paris on the eve of a revolution.

"But this marvellous energy showed itself not only in strong declamations and scathing denunciations; it appeared as markedly in the hearty laugh at all sallies of wit, and the ready applause of all that pleased Conference. So we were led to speculate how much of the speaker's strength was due to the lively sympathy of an alert audience. We have more to learn as hearers than as speakers from our English brethren. For, after all, we should like to have impassioned speech reserved for cases able to show efficient cause for vehement declamation, and to preserve calm composure for ordinary business. But there is a guillotine in the shape of a bell that descends ruthlessly at set intervals, and speakers are led to crowd and crush their deliverances into burning periods at a furious rate. To such, however, a striking contrast was offered by the cultured grace of the Chrysostom of Cambridge, Dr. Butler, Master of Trinity, the clear-cut classicism of Professor Jebb, and the silver-tongued, genial oratory of Dr. Hill, Vice-Chancellor of the University, not to speak of lady Ciceros like Mrs. Burgwin, Miss Hughes, Mrs. (Dr.) Bryant, and others, whose high-toned eloquence is almost beyond praise.

"No one could attend Conference without having his educational susceptibilities and capabilities alike stimulated and strengthened, or without feeling that, whether or not the avocation of the teacher will ever be ranked on a par with the so-called learned professions, financially and socially, it is fast coming to be recognized as equally dignified and beneficent and sacred."

FRANCE.

M. J. Gaillard responds as follows:—

"Permettez-moi, à mon retour en France, de vous adresser mes impressions sur le Congrès des Instituteurs anglais, à Cambridge, où je représentais, avec mon collègue, M. Desmedt, l'Association des Instituteurs du Département du Nord.

"Je ne me faisais d'abord aucune idée de ce qu'était réellement l'Union nationale des Instituteurs anglais. Je la jugeais un peu d'après nos associations locales, où nos intérêts sont discutés avec talent sans doute, mais dont les résolutions n'ont pas auprès des pouvoirs publics cette force que leur donnerait un congrès national de toutes les associations locales fédérées.

"L'Union nationale des Instituteurs anglais, avec ses 41,000 membres, constitue une force redoutable avec laquelle les autorités sont obligés de compter.

"C'est le levier qui leur permettra la réalisation de toutes leurs revendications, et particulièrement la sécurité de leur position et l'assurance de leur tranquillité pour leurs vieux jours.

"C'est aussi par la puissance de cette Union et la solidarité de ses membres qu'ils parviendront à élever le niveau moral et intellectuel du pays, en étudiant dans leurs congrès les meilleures méthodes pour l'éducation de la jeunesse.

"Grâce à elle, ils sont déjà arrivés à des résultats remarquables, et l'instruction lui doit les progrès considérables qu'elle a réalisés depuis 1870.

"Leurs députés, Mr. Gray, Mr. Yoxall, etc., les défendent à la Chambre des Communes, avec autant de dévouement que de talent, jusqu'à la limite extrême de leurs droits.

"Je conserverai le meilleur souvenir de ce Congrès de Cambridge, tant par le cordial accueil que nous avons reçu partout que par l'intérêt que présentaient les discussions.

"Mais ce qui m'a le plus frappé, c'est le grand nombre des auditeurs qui assistent aux réunions; c'est le bon ordre, la discipline qui règne dans ces longues séances, où la voix du président toujours est écoutée et respectée; c'est aussi l'habilité des orateurs, c'est encore et surtout la large part que les charmantes institutrices anglaises prennent aux débats. Elles font non seulement la grâce et le charme de ces réunions, mais elles contribuent à leur succès.

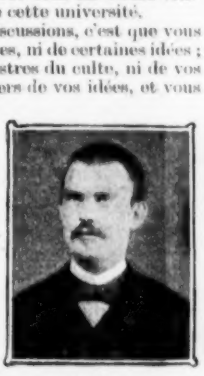
"En terminant, Monsieur le Directeur, permettez-moi de profiter de cette occasion pour remercier nos collègues d'Angleterre d'avoir bien voulu nous inviter à leur Congrès."

M. Desmedt records his impressions thus:—

"Vous me demandez mon impression sur la Conférence de Cambridge. Il m'est bien difficile de rassembler quelques idées. Vous m'avez tous comblé.

"Monsieur le Vice Chancelier a été charmant pour moi. Je forme des vœux pour le succès de la vieille Université de Cambridge si forte de ses traditions glorieuses. Je sais que les deux choses que l'Université de Cambridge aime par-dessus tout sont la science et la liberté, et je m'associe avec tous les cœurs vraiment anglais à la prospérité croissante de cette université.

"Ce que j'ai admiré en écoutant vos discussions, c'est que vous n'êtes les prisonniers ni de certains groupes, ni de certaines idées; vous n'êtes les prisonniers ni de vos ministres du culte, ni de vos autorités locales. Vous êtes les prisonniers de vos idées, et vous ne connaissez pas d'autre servitude. C'est beau cela. Il m'a semblé aussi qu'malgré les différences d'opinion — différences nécessaires au progrès, mais différences qui doivent aider à votre mutuelle estime, à votre éternelle concorde — vos hommes du comité exécutif et vos deux membres du Parlement ont fait admirablement à la Conférence, et hors de la Conférence, la politique de ceux qui pensent aux autres. C'est que, voyez vous, cher monsieur, je n'aime pas moi la politique du poing fermé pour combattre, aussi est-ce avec un grand plaisir que j'ai constaté chez tous vos membres du comité, conservateurs ou radicaux, la bonne politique de la main tendue pour secourir les petits. Cela est encore très beau et très noble, et cela devrait partout exister. Je vous félicite de votre esprit large, de vos idées libérales. Vous ne fermez pas les portes du sanctuaire. Vous ne voulez pas être une petite église, mais la grande église pouvant contenir tous les instituteurs et institutrices."



M. DESMEDT,
French Delegate.

The New Penny Magazine (Cassell and Co., Limited) is by this time well known as a wonderful example of what a penny can purchase of wholesome literature. The first volume is now before us, and, in its strong, handsome binding, forms a remarkable storehouse of good popular reading, varied in character, and well illustrated. We can testify from practical experiment that it is a popular book with boys.

THE PUBLISHERS' EXHIBITION.

A VERY practical purpose is undoubtedly served, and a good deal of genuine interest aroused, by the exhibition of books, school materials, and educational appliances which takes place annually in connection with the Teachers' Conference. The gathering of so many hundreds of representative teachers from all parts of the country affords a capital opportunity for the publishers to bring their wares under the notice of likely customers, and the latter gladly avail themselves of such a favourable occasion to become in some measure acquainted with the newest helps to teaching.

The show at Cambridge surpassed, in many respects, those of former years. It was held in the Corn Exchange, a large building situated close in the rear of the Guildhall, where the Conference was held, and it was in every way admirably suited for the purpose. The main portion of the building, ordinarily occupied by farmers' market-stands, measures some fifty-four yards long and as many feet wide. This space, for the purposes of the exhibition, was divided into three broad avenues, and along each side of these a continuous series of stalls ranged almost the entire length of the building. The place was extremely well-lighted from the roof, so the abundant wall-space was available for the display of maps, pictures, charts, and lesson-sheets, and it was utilised to the full.

As at Cheltenham, the most striking feature was the remarkable number and variety of the appliances intended for visible illustration and practical demonstration; and, owing to the width of the gangways, it was possible to see these exhibits to great advantage.

Since the number of exhibiting firms exceeded sixty, it would carry us beyond the limits of our space if we attempted to give details about each stall, or even to mention all the objects worthy of special attention. But this is really the less necessary because, in our review columns, month by month, we bear witness to the fertility of the educational press, and endeavour to guide our readers in the choice of school-books and scholastic apparatus.

MESSRS. T. NELSON AND SONS' STALL.

A few firms distinguish themselves by almost confining their exhibits to long ranges of books for school use, for students, for prizes, and school libraries. In this class may be mentioned Messrs. Bell and Son, Blackwood, Burns and Oates, the Cambridge University Press, W. Collins and Co., Heffer of Cambridge, Jarrold and Co., Longmans, Green, and Co., and Macmillan and Co.

Others add to books a considerable variety of other articles—such as maps, prints, drawing-sheets, and diagrams. Thus Abbott, Jones, and Co. add to their books scientific diagrams; Blackie and Sons show a series of maps and drawing-sheets in boxes; Cassell and Co. show pictorial helps to teaching, and W. and R. Chambers object-lesson sheets; Chapman and Hall a number of aids to art teaching—designs, vases, casts, and apparatus; Gill and Sons a set of new cartographic maps. Edward Arnold, besides his various sets of new reading-books, including one adapted to serve local interest, and another, the "Ranger" Series of abridgments of popular stories, shows some admirable decorative pictures of flowers and animals. Sampson, Low, and Marston press forward the claims of Jackson's *Upright Writing*, and offer also for inspection their important work on *New Methods in Education*, and the really remarkable artistic work, *The Life of Christ*, illustrated by M. J. Tissot. Many who saw these handsome volumes at Cambridge probably regretted that their cost placed them out of reach. M'Dougalls exhibit some tasteful record-forms.

AN EDITORIAL GROUP.

The National Society and the Religious Tract Society distinguish their stalls by the attractive show of Scripture and religious prints, the latter having also a well-constructed model of Herod's Temple.

T. Nelson and Sons exhibit their many series of school books, some new sets of wall-sheets for object teaching, and an excellent set of illustrations for Standard II. geography.

Among new-comers into the ranks of educational publishers are to be noted G. Newnes and Co. and A. Pearson and Co. The former publishes the Golden Rule Readers, with an ethical basis, and the characteristically-named *Tit-Bits Copy Books*; while Pearsons show a useful series of maps and the earliest issues of their Attractive Readers, which were represented at the Cheltenham exhibition only by framed sets of the illustrations. Judging from a hurried glance, Messrs. Pearson's books appear richly to deserve their title.

G. Philip and Sons have an extensive display of maps and prints for schoolroom walls, and are rivalled in the same line by Bacon and Co. and by A. Johnston. Bacon's chart of Poisonous Plants is a beautiful production, and is likely to be of great use.

The show of certain exhibitors is of such remarkable range that it seems to cover the whole field of educational enterprise. Of these, E. J. Arnold of Leeds, A. Brown and Sons (another Yorkshire firm), and the Educational Supply Association, must be specially mentioned. In each case the exhibits include maps, pictures, wall-sheets, cabinets of objects, mechanical contrivances, and all sorts of helps to the teaching of practical and scientific subjects. A very noteworthy feature in Messrs. E. J. Arnold and Sons' is the set of coloured relief maps of portions of England. It would be well if every school had one of these excellent models. Another object that seems to give promise of being useful is a contrivance for rapidly sharpening drawing pencils. The object-lesson cabinets are arranged on an admirable plan, and the large photographs and the A. L. coloured photographs are extremely effective as school decorations.

While, as we have seen, some of the houses represented cover the whole range of appliances, others limit themselves to a particular class of goods. Thus the Teachers' Company,

Redditch, show drawing appliances, and especially models; Charles and Dible have an extensive show of kindergarten materials; William Harbutt of Bath exhibits the clean modelling material, plasticine, which is now supplied in various colours; Townson and Mercer show scientific instruments in great variety; and the Yorkshire Educational Supply Association show benches and tools for use in manual training. These illustrate in a striking manner certain conspicuous features in modern educational development.

Other exhibits illustrate the modern movement in a somewhat different way. Sir Isaac Pitman and Sons, in addition to their well-known "Avon" and "Ideal" series, put shorthand well to the front; and no fewer than four typewriters are on view—the Bar-Lock, the Empire, the Remington, and the Williams. These and the "Trypograph" manifolding apparatus testify to the growing demand for time-saving appliances in education and in business, as also does the exhibit of the Coventry Scholastic Cycling Company.

Our own particular stand was quite up to date; for besides a display of our Object Lesson Supplements and a pile of the latest issues of THE PRACTICAL TEACHER and *The Practical Teacher's Art Monthly*, we had close to us an Edison-Bell phonograph in full working order. Our booklet *Who's Who at Conference* was unmistakably popular, and an object of constant consultation. To the representatives it seems to have served the purpose of a reference library. To ourselves it was a great pleasure at the exhibition to meet old friends, to make new ones, to receive suggestions, and especially to listen to the hearty compliments and thanks of those who have found in our journals constant and welcome help.

It is, of course, no secret that many of the publishers' representatives are ex-teachers, who have preferred, probably for good and substantial reasons, to turn from the world of school to the world of business. But there are some who remain in active work as teachers, and yet endeavour to extend the use of some pet contrivance of their own to other schools. And we are glad to meet again such well-known scholastic friends as Mrs. Hibbert of Shrewsbury, with her ingenious knitting apparatus and other valuable specialities; Miss Lambert, with her paragon needlework frame; Mr. Towers, with his word-building machine, which will almost keep up with his rapid explanations; and Mr. J. Wollman, with his clever contrivance for adapting old desks, at a small cost, to the recent requirement of the Education Department, that when a desk is used for writing its inner edge must be vertically over the front edge of the seat.

Messrs. Cresswell, Ball, and Co., and the Educational Musical Instrument Company, exhibit pianos on which now and then lively strains are heard; and stalls at which music for schools is displayed in abundance are furnished by Messrs. Curwen and Sons, and by Novello and Co.

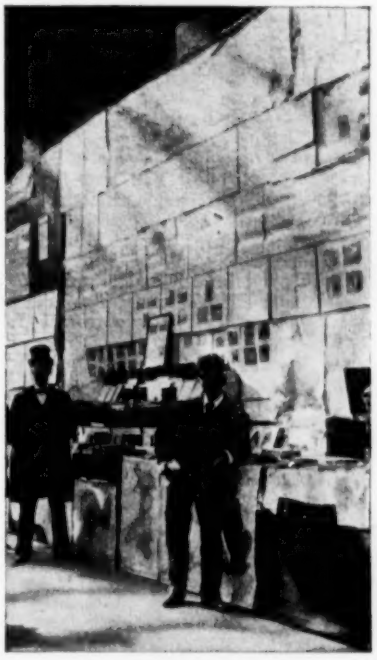
We must not omit mention of Messrs. Hardtmuth's exhibit of lead-pencils. The Koh-i-noor pencil is really an excellent one, and the series of drawing-pencils—lead and coloured chalks—are worthy of a trial. This firm also shows a new fountain pen—the Koh-i-noor—for which, as a single-feed pen, certain advantages are claimed over others in the market. A very complete case to illustrate the manufacture of lead-pencils has been fitted up, and is supplied by Messrs. Hardtmuth.

We might greatly extend this notice by further particularising, but we do not wish to weary our readers. Our ramble has brought us to the northern end of the hall, where we find ourselves among a stock of desks, easels, partitions, and other school furniture, shown by Wake and Dean, Hammer and Co., and some other companies. But more attractive than these we find the

FINE ART ANNEXE,

which here opens out on the western side.

This is a new feature of the Publishers' Exhibition, and one which we trust will be maintained and extended in future years. The idea, we believe, is mainly due to Mr. R. S. Wood of Bolton, and the execution at Cambridge has been in the hands of Mr. Horobin, who are both to be congratulated on the success of their plans and their efforts. The four walls of a large and lofty room, as well as some screens in the centre, are hung with an admirable selection of engravings, photographs, and coloured pictures contributed by publishers and other friends. The most extensive exhibit is a series of thirty-six beautiful engravings and etchings supplied by H. Graves and Co., the well-known printsellers. Among these are fine examples after Ansdell, Landseer, Leighton, Sant, and Turner. The Art Association for Schools sends a number of its publications in colour as well as engravings. G. Bell and Sons show some of the characteristic coloured cartoons known as the Fitzroy Pictures. Cassell and Co. send a number of interesting studies, drawings and photogravures. Some very delicate and attractive coloured pictures of flowers are shown by Blackie and Sons and by G. Philip and Son.



MESSRS. BLACKIE AND SONS' STALL.

An extremely interesting exhibit is a set of six panels in terra-cotta sculpture by the famous artist, G. Tinworth. These are contributed by Doulton and Co. With them we must notice also the exquisite photographic reproductions of eight of Mr. Tinworth's scriptural reliefs sent by Gladwell and Co. From Gibbons, Hinton, and Co., of Brierley Hill, come fine examples of artistic dado tiles, hearth panels, and ornaments in majolica.

O. Newmann and Co. exhibit some fine illustrations of classical subjects, and A. Johnston and W. and A. K. Johnston some chromo-lithographs illustrating history and topography.

The large A. L. photographs of E. J. Arnold, and similar pictures from the Educational Supply Association, occupy a prominent position, as also do the beautiful coloured photographs of the Photochrom Company. This company has recently developed its operations in one or two new directions. It has undertaken the work of process reproduction in half-tone and other forms, and of this branch of its work, carried on at Tunbridge Wells, a pleasing account is given in a neat *brochure*, "An Artistic Industry in an Artistic Town." Very large bromide prints of York and Lincoln cathedrals hanging on the walls bear witness to the excellent results obtained. Another branch of the work seems to have less affinity with photography and the pictorial art. The same company exhibit some really exquisite specimens of natural objects preserved by a new process which retains the actual colours. Among the examples shown are the green lizard, a salamander, some pieces of coral with the zoophytes still attached, and some magnificent butterflies and moths. These objects, shown in cases with convex glass

MR. W. T. HAYNES,
Secretary Publishers' Committee.

fronts, are highly ornamental as well as useful, and their production seems to mark a new departure in some branches of science study.

A large consignment of art pictures for schools collected in Holland from many sources by the genial and popular Dutch representative, Mijnheer Van Dam, or rather a portion of it, was on view during the latter part of the week, not in the Art Annexe, but in a spare corner near the entrance to the Publishers' Exhibition. It included a series of capital educational designs in colour, several coloured pictures illustrative of industrial and rural life in Holland, and a number of beautiful photographs supplied by the kindness of the civic authorities from the museum at Haarlem. Hearty thanks are due to Mijnheer Van Dam for the trouble he took in providing so interesting a collection.

A very neat booklet presented to visitors contained a catalogue of the pictures exhibited, and forms a pleasing souvenir of this admirable exhibition. The idea is one to be highly commended, and is another step in the direction we have advocated in our papers on Art Pictures for Schoolroom Walls. It indicates a growing recognition of the fact that the schoolroom is not merely the anteroom for the world of business, where draughts of knowledge must be swallowed in order to acquire fitness for future work to be done, but a place where the whole nature must be cultivated, and where the youth of the nation may be inspired with high thoughts and prepared to appreciate the world of Letters and Art as well as of Science and Industry.

THE HEADS OF THE SCHOLARSHIP LIST.

ON receiving the Queen's Scholarship List, we communicated at once with the head boy and the head girl, with a view to obtaining from them some information as to their preparation for the examination in which each of them had attained such a distinguished position. Mr. Dennis E. Yarnold has supplied us with a detailed account of his training, which contains so many suggestions likely to be valuable to future candidates, that we gladly print it in full, and commend it to the consideration of those of our readers who may be preparing for the Scholarship Examination. In a letter we have received from him, Mr. Yarnold tells us that, though he has not definitely used this journal in his Scholarship work, he "has frequently read it, is familiar with its splendid style, and commends it to everybody."

Miss Mary Ellen Wood, the first on the girls' list, sends the information we asked for in the form of brief notes, which we also print as received. We feel sure that many of our readers will be interested in the facts embodied in these short papers; and while we heartily congratulate our young contributors, we thank them for enabling us to place their experience on record for the benefit of others.

MR. DENNIS E. YARNOLD.

"I have been requested by the editor of THE PRACTICAL TEACHER to write a short article on my career in view of my recent success at the Queen's Scholarship Examination. My early life has not been in any way remarkable, and it is only within the last year that I have become known outside the circle of my own friends. The place of my birth was a little village called Sidemoor, near Bromsgrove, in Worcestershire. Here, for the first nine years of my career, I enjoyed the benefits of a life in the country, the last part of the time living on a farm which my father was working as a hobby in conjunction with his other business.

"Shortly after the death of my mother (when I was eight years of age) we came to Leicester, and after finishing my schoolboy life at this town, I was appointed by the Leicester School Board as a candidate for the profession of pupil teacher, and took up my post with my recent schoolmaster, Mr. G. F. Cross, under whose care I had prepared for the examination for candidature.

"During my apprenticeship I had the inestimable benefit of being attached to one of the best pupil-teacher centres in the kingdom, directed by T. R. Ryder, Esq., B.A., Mus. Bac., to whose excellent organisation the Leicester Pupil-Teacher Centre owes its present state of efficiency. Under his supervision my course of study has been wisely mapped out for me, and to every part of the Scholarship curriculum has been assigned its due portion of my time each week.

"While studying for the Queen's Scholarship, my only outdoor recreations were cycling and walking, and my favourite pastime was music. During my preparation for the examination I received invaluable assistance from my esteemed schoolmaster and friend, Mr. G. F. Cross, who has taken care that the practical part of my training should not be neglected by entrusting me from the commencement of my teaching career with a part or the whole of one of the standards, and thus giving me a good knowledge of the whole school work. Chiefly to his splendid tuition in history, and to the efficient efforts of our geography instructor, Mr. W. H. Breeze, F.R.G.S., I owe my success in obtaining 'H.' and 'G.'

"In my studies I don't know that I used any special text-books, except in English language and history. I used Professor Meiklejohn's Grammar, which was very ably supplemented by the chatty lectures of our tutor, Mr. F. Gator, B.A. Although English is generally considered a dry subject, I never found it so, especially when we came to study the building up of the language and its literature. Mr. Gator has such wide reading in his subject that he is never at a loss to make the lesson bristle with interesting information, which does one far more good than 'stewing' over a text-book. He always made special points of groups of writers, and the comparison and contrast of styles, paying very little attention to dates of authors.

MR. DENNIS E. YARNOLD.

"Our essay-writing was supervised by the Centre class director, Mr. Ryder. Mr. Ryder is a man who knows something of everything. He never gave us any information that we might easily find out for ourselves; he said his time was too valuable. I think his greatest genius must lie in his power of criticism. Scarcely any student ever wrote an essay in which our master could not find some weak point, and show us how to improve on it.

"Our instructor in arithmetic, Mr. A. Ball, B.A., used about every suitable text-book to be found, and used also his fertile ingenuity to select all the most typical examples suitable for Section III. on the Scholarship paper.

"In history I used Osmond Airy's text-book, and also Ransome's smaller. The latter is a good book, which comfortably covers the Queen's Scholarship Syllabus, but I chiefly used Airy. This book is very comprehensive, and rather unsuitable for the use of a private Scholarship student, but with a history tutor like ours we found it very valuable. Mr. Cross paid great attention to the causes and effects of events—to the growth of one event out of another—and to the constitutional history of the country. He has had such a wide experience in the subject, having been tutor for about fifteen years, that he is almost able to forecast the examination paper, and in the special reign this year he had given us the very same questions that appeared on the history paper.

"While studying in geography, I read through Professor Meiklejohn's and part of Gill's Student's Geography, but I am quite certain that the most useful geography is to be learned from a clear atlas and wide newspaper and journalistic reading. Books of voyages and travels furnish much geographical information in an interesting form. Too much attention cannot be paid to sketch maps made by the student himself. Our tutor, Mr. Breeze, scarcely ever gave a question which did not embody several of these sketches, and the result was that every student gained a good general knowledge of the globe. To be successful in this important study, a person must be up to date in his information. He must be familiar with such events as the construction of the 'Cape to Cairo' and 'Siberian' Railways; with such expressions as the 'Mailed Fist,' 'Sick Man,' 'Open Door of Trade,' etc., etc. And this, together with a wide commercial intelligence, can only be gained from the every-day press.

"Our master of method, Mr. Pearson, is also a man of great experience and high repute in his subject. He did not give us any reading to prepare from any text-book, but devoted the whole of our time to the study of his notes, which are based entirely on previous examination questions. It is a certain fact that any one who thoroughly understood his notes could not fail to pass the examination in the Theory of Teaching; and it is worthy of note that the answers to several of the questions at the last December examination are to be found in them. As an answer to the question on criticism lessons, I simply reproduced Mr. Pearson's notes exactly.

"Last, but most important of all, comes mathematics, to which are assigned more marks than to any other single subject. In this subject there is a hard task before the student who has not a competent tutor. Our instructor, Mr. Eastwood, is certainly a clever mathematician, and a teacher who has the interests of his pupils at heart. In algebra, he used with us Hall and Knight (elementary) for the Scholarship work, but he frequently supplemented this text-book with examples of his own. At deductions he is specially clever, and I think he must have been somewhat disgusted at the simplicity of the papers this year after the training he had given us.

"In studying for an examination like the Queen's Scholarship, where there is a great variety of subjects, the chief difficulty is to keep all of them well in hand, and not to devote too much time to one special subject. If a fellow is to do well in the examination, he must do well 'all round.' Every mark means a place, as a rule; and it is not well to do good work in some subjects and badly in some others. If this is done, the student cannot expect to gain a good position on the list. It is a good plan, also, not to read for too long a period at a time, as the brain must necessarily become fatigued, and time is thus wasted. If the whole evening is free for study, it should be broken into two parts—the first rather longer than the second; and a sharp walk for half an hour should be taken between the two halves.

"I think that with average ability from three to four hours per day of steady work from the end of the mid-summer vacation should suffice to cover the syllabus.

"At the examination the golden rule is, 'Keep cool.' It is fatal to lose one's equanimity. Unless the mind is calm, it is impossible for a student to make the best use of the knowledge at his disposal, and hence he is disappointed at finding himself lower on the list than he should be. The greatest difficulty that presents itself at the examination is to find time to get all finished; but this can be largely overcome by cultivating from the commencement of the apprenticeship a good flowing hand.

"A little rule which was given to me before entering the examination, and which cannot be overrated in value, is: 'Read the questions before attempting to answer them.' It is also a good plan to answer the question proposed by the examiner, and not to write a lengthy discourse on something altogether irrelevant to the subject.—Yours very truly,

"DENNIS E. YARNOLD."

MISS MARY ELLEN WOOD.

"*Educated* at Berridge Road Board School and People's College, Nottingham. At the latter school I gained scholarships to the value of £36.

"*Pupil teacher* at People's College Higher-Grade Board School, Nottingham.

"*Trained* at the Nottingham School Board Pupil-Teacher Centre. The valuable instruction received there from Mr. J. B. Hughes, the chief instructor, and his assistant, Mr. P. W. Evetts, B.A., has contributed much to my success. All through apprenticeship careful teaching and copious well-arranged notes have been given; the various notebooks having been preserved, formed an invaluable aid in studying for the Scholarship Examination.

MISS MARY ELLEN WOOD.

"*Certificates.* — First Class in Advanced Hygiene, Advanced Physiography, Freehand, Model.

"Passes in Elementary Magnetism and Electricity, Physiology, Theoretical Chemistry, Practical Plane and Solid Geometry, Mathematics (Stages I. and II.).

"Elementary and Advanced Drill Certificates.

"First Class in Third Division of College of Preceptors.

"I took the Cambridge University Extension Course of History in 1898, and passed with distinction.

"*Favourite Study.*—Study of any description has always been a great pleasure to me, but I think perhaps my favourite subjects are English and mathematics. The knowledge of algebra was very helpful to me in the Scholarship Examination, since it enabled me to attempt successfully the highest marked questions in the paper on mathematics.

"*Text-books used.*—Grammar—Evan Daniel's. History—Meiklejohn's, Green's. Geography—Brook's. Mathematics—Layng's Euclid, Hall and Knight's Algebra. School Method—Garlick's. French—Longman's.

"Concerning my *private study*, much has been done by utilising spare moments, and by regular and systematic study for three hours every evening for some considerable time prior to the examination.

"*Favourite Pastime.*—Reading. I also found ten minutes or a quarter of an hour's music in the middle of the evening's study very beneficial."

CONFERENCES WITH PRACTICAL TEACHERS.

BY AN INSPECTOR OF SCHOOLS.

VI.—ORGANISATION.

WITH regard to the organisation of a school, there is much that concerns the managers. Some of the defects under this head are consequently beyond the teacher's control. For instance, if infants are not supplied with suitable desks, or with suitable galleries fitted with desks according to modern require-

ments, the teacher cannot be blamed for the defective housing of the children. There are many minor improvements, however, which a teacher can suggest to a manager; and when these suggestions are made, an estimate of the probable cost should be given if possible, for a man will be more likely to carry out an improvement when he knows what expense will be incurred than when he is partially or wholly ignorant of the prices of school furniture or material. We remember making a suggestion to the managers of a remote village school which at first quite alarmed them; but when asked if they admitted the appositeness of the suggestion, they readily agreed that certainly the improvement, if made, would benefit the instruction and make the children more comfortable. They were then told that *three pounds* would probably cover the whole cost; whereupon they were quite surprised, and promised to buy the required apparatus.

No matter how remiss the managers may be, an inspector cannot excuse a teacher who allows little children to seat themselves *tailor-fashion* on the floor of the schoolroom while they attempt to write or do their kindergarten exercises on the forms. Such a position is unnatural and injurious, and should not be allowed under any circumstances. There are few schools nowadays, let us hope, in which the young children are not supplied with suitable desks, even if they are children of the gallery classes. Some there are, however, that have yet to adopt simple plans for securing ordinary comfort for the little ones, which, after all, is the first indispensable condition to be looked for in a good school.

Nor can any satisfactory excuse be made for placing babies or very young infants under monitresses or young teachers when in the same school there are more experienced teachers available. One feels disposed occasionally to write the sad case of the little ones in verse—a desperate kind of feeling, it must be admitted—when he hears in the distance the wailing of the babies on his approach to the school premises. Yes, verily, the babies have a grievance under such circumstances; for young teachers expect too much from them—are tyrants, in fact, without knowing, of course, that they are acting with cruelty towards the tender natures under their care. It is quite enough to see children playing at school in the streets to enable us to judge how severe they are one to another. One very simple but apparently necessary implement is always in evidence, and whether this spontaneous demonstration of the cane comes from instinct or from experience is a matter which some naturalist will perhaps later on decide. But we are serious in our remarks withal, and earnestly hope that our words may serve the little ones a good turn.

These difficulties of organisation do not occur generally in well-equipped Board schools, where, as a rule, each class is under a separate adult teacher. But these large schools are not always free from serious defects. Certainly there is something wrong in the organisation of a school when two, three, four, or five hundred children are sent out into a small playground at the same time, especially if the *office* accommodation is limited; and where this kind of thing occurs, and the class teachers remain indoors, the defect of government is extremely reprehensible. In large schools the children should go out to play in sections, and they should be well superintended to guard against misconduct; for mischievous habits grow rapidly, even among young children, if teachers are not vigilant. Monitors or monitresses can never fitly take the place of experienced teachers in a matter requiring great tact and discrimination.

School time-tables should be drawn up with a view to a good distribution of the recreation of the children; and in infant schools the time-tables should allow for short, brisk lessons as far as possible.

The warming and ventilation of the schoolrooms are not always attended to as they should be. The thermometers, though often hung in conspicuous places, appear to be seldom referred to, and one finds great variety of temperature in the rooms of a large school, and unfortunately suffers much inconvenience in consequence. A thoughtful teacher of our acquaintance checked a prevailing tendency to sore throats among her staff by carefully attending to the warming and ventilation of the classrooms. When she took charge of the school in question, she found that the assistants worked on regardless of all necessary precautions in these respects; and by insisting on certain rules which she laid down for the guidance of the staff, she was successful in materially improving the health of her assistants. Of course it is necessary to have thermometers that will work correctly. Cheap instruments are often faulty and useless, unless they are guaranteed to register correctly in the neighbourhood of sixty degrees.

It cannot be denied that it is a cruelty to keep children, especially ill-fed and ill-clad children, in cold rooms; nor can the dangers of catching cold be removed if teachers and children go out into the wintry air after working for several hours in hot, stuffy rooms. This subject was touched upon in an earlier paper, but the importance of the matter is sufficient excuse for giving further details here.

The subject of school organisation is, of course, a wide one, and a whole book might well be written dealing with questions directly or indirectly included under this head; but our purpose is to avoid being discursive, and therefore we must confine ourselves to the strictly practical side of the subject, concluding this section of our conferences with a few remarks on desk accommodation and on the appearance of the schoolrooms.

The old parallel desks are still to be found in many schools, and no objection can be taken to them, provided they are not indented with years of service, and while they are of suitable height for the children. But when an inspector finds young children sitting in desks meant for older scholars, with their feet dangling beneath the forms instead of resting on some support, he has a right to condemn them. It is quite bad enough to find these desks without supports for the backs of the scholars, or to find them so uneven as to interfere with the writing and drawing exercises. When, however, an official discovers little ones being deformed by bad sitting accommodation, or big girls stooping in the desks supplied for junior children, he cannot be blamed for bringing pressure to bear on the managers, if the fault rests with them.

The managers are not always to blame, however, for this mismanagement. In two instances, quite recently, the writer found suitable desks in the school; but the children, for want of rearrangement by the teachers, were sitting at a great disadvantage—the big girls in one case, and the little boys in another, looking most unsightly in the different classes.

It is astonishing what a great change can be wrought in the appearance of a school by a little extra thought and industry on the part of managers and teachers. In one of the poorest localities under inspection, and in a district where the principal manager is by no means well off, there is a school of poor children which it is a pleasure and a privilege to inspect, owing to the care bestowed on the school furniture and premises. This manager in his spare time—and he is a very active and busy man, by the way—has remounted many of the school pictures and varnished them; he repairs the reading books when he cannot afford new ones, rather than allow the children to have a bad example of untidiness before them; he regularly attends to the clocks in all the departments, to keep the time accurate; and in a great variety of ways he devises plans which give encouragement to teachers and scholars alike. And he declares that all this trouble *pays*, apart from the appearance of things; for he is delighted to find in the personal habits of the children a reflection of all his care, not only while they are scholars, but in later years when the children have reached manhood and womanhood.

Contrast this picture with the view of a school whose walls are covered with all manner of advertisements, sightly or unsightly; where no attempt is made by the managers to get a good supply of school pictures, and where the teacher, in sheer desperation, has called in the aid of the commercial world. Surely there is a great difference educationally between two such centres of learning, and the children taught in the latter kind of school are under a great disadvantage compared with those educated under well-ordered management.

Yes, it is all-important, in all poor localities especially, to make the schools clean and attractive in appearance. The child will partake of the nature of its environment, even in external matters; and if we cannot directly improve the homes of the children, we can do good indirectly, with regard to social improvement, by setting the children good examples of neatness and orderliness in the school premises.

Although we have dealt separately with the question of school organisation, this subject cannot strictly be considered as quite a distinct feature of school-keeping. It is impossible to separate from organisation entirely the effectiveness or non-effectiveness of the instruction. Still, the general equipment and management of a school are usually regarded apart from the actual teaching requirements, and it is well perhaps to recognise some practical difference, particularly when one finds a brilliant teacher lacking the powers of methodical work, or where an average man or woman makes up his or her deficiencies by steady, persevering, and orderly government.

See THE PRACTICAL TEACHER'S ART MONTHLY for ANIMAL STUDIES FOR SCHOOLS. New Schemes of Drawing appear Monthly.

The Best of the Hundred Best Books.

A SPECIAL OFFER TO PRACTICAL TEACHERS.

IN the most famous list of the hundred best books the first place, as a matter of course, is given to the Bible. In the vast majority of the popular schools of our land an essential part of the daily work consists in reading and explaining selections from the various books of the Bible.

To the task of elucidating every difficulty in these ancient writings have been directed the untiring efforts of the most eminent scholars, the most patient investigators; and the results have been embodied in innumerable works for the guidance of teachers, preachers, and students.

Now, for the teacher preparing a lesson, as for the student pursuing any special study, it is important, if possible, that he should not have to lose time in seeking information scattered through so many different books. Accordingly, publishers of Bibles have bound up copies of the Bible text with appendices of aids to students and teachers; and the purpose of this article is to call attention to the latest of these combined works, which has, we think, strong claims to be called *the* **Teachers' Bible.** This work, published by Messrs. Thomas Nelson and Sons, consists of the Authorised Version of the Holy Bible, followed by Nelson's *Illustrated Bible Treasury.*

The books of the Old and New Testaments are beautifully printed in minion type on double-columned pages, with a narrow central column for the ordinary marginal references. The Old Testament occupies 802 pages, and the New Testament 245.

It is, however, the Bible Treasury which constitutes the remarkable and distinctive feature of the volume. This work has been produced, under the general editorship of Dr. William Wright, by the co-operation of some forty contributors, nearly all of whom are of the highest repute as experts in special departments of Biblical scholarship. Professor James Robertson writes sections on the Title of the Bible, the Canon of the Old Testament, and its transmission; Professor Sayce contributes articles on Monumental Testimony, and the Nations of the Bible; Lieut.-Col. Conder treats of the Topography of Bible Lands, and General Sir Charles Wilson of the Travels of St. Paul. Introductions to the various books of the Old Testament are supplied by Drs. J. Robertson, A. B. Davidson, Sinclair, M'Curdy, and others; and to those of the New Testament, by Drs. Riddle, Ramsay, Marcus Dods, and Talbot Chambers. Such subjects as Geology, Astronomy, Natural History, and Antiquities are dealt with separately by Professor Bonney, Mr. E. W. Maunder, Canon Tristram, Dr. Gunther, and other specialists. This list might be greatly extended.

The various subjects are presented in the best possible form, and are extremely well arranged and fully indexed, so as to facilitate reference.

A further useful and attractive feature are the illustrations, which number about 350, and include views of Bible scenes, reproductions of monuments, coins, implements, and other interesting objects, as well as admirable figures of animals and plants.

The Bible Treasury is followed by a valuable Combined Concordance, with a Dictionary of Proper Names and Subject-Index. In this are indicated all the important variations in the Revised Version. Lastly, we have a series of Maps of Bible Lands carefully drawn and coloured, and accompanied by a full Index of Places marked.

The whole work forms a truly marvellous cyclopædia of Bible knowledge, from which nothing desirable appears to have been omitted. Since the total number of pages is fully 1,800, the volume might be expected to be rather cumbersome; but quite the reverse is the case.

To make the book the more serviceable, it is substantially bound in full morocco limp, the corners of the leaves as well as those of the covers are rounded, and the edges of the former are red under gilt.

We have examined other Teachers' Bibles, but we feel justified in saying that for comprehensiveness and completeness of contents, for convenience of form and size, and for perfect finish of material production, the one now before us is unmatched by any of its predecessors. The publishers issue a great variety of editions—some much more expensive—but this particular edition, on account of its serviceable character, seems to us best adapted for a teacher's regular use. In our opinion, indeed, it deserves to be regarded as **The Practical Teacher's Bible** *par excellence.*

This brings us to the special point and purpose of this short paper, which is, to make an announcement for the benefit of our readers. The work we have just described is worth half a guinea. But in order to place it within easy reach of every one of our subscribers, the proprietors of THE PRACTICAL TEACHER have made arrangements by which any purchaser of this journal may obtain a copy of

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THE EDUCATIONAL WORLD

A REVIEW OF EDUCATIONAL TOPICS AT HOME AND ABROAD.

EDUCATION IN ENGLAND.

N.U.T. NOTES, ETC.

BY T. J. ELLERY, F.R.G.S.,

President of the National Union of Teachers, 1895-96.

The Cambridge Conference. It is now generally admitted that Conference has outgrown itself, in point of numbers, to such a serious extent that the best results cannot possibly be secured. As a matter of fact, it is a mass meeting, with all the disadvantages attending such a gathering. Under all the circumstances, one is surprised at the amount of work actually done during the week, but no one will deny that a smaller gathering could have done more.

Then, too, from the purely business point of view, there were too many functions of one kind and another, involving too great a strain upon the energies of the representatives. The *evening* meetings alone have increased so greatly that there is practically no break in the work from Monday until Friday or Saturday.

Yet it was all very delightful, of course, especially to those who revel in a "busy" week! And surely the excitement of the balance-sheet, the annual heckling of the genial treasurer, and the "mystery" of those dinner tickets, together with the new feature, the examiners' report upon the finances for the past year, are a tonic sufficient to brace many up for the whole week! Speaking generally (if I may be allowed to use the word after all that Conference had to say about it), I do not remember a better attendance at the various meetings in any previous year. Representatives were evidently bent upon missing as little as possible. From all one heard, there were to be many "scenes," some of them of a sensational character; but those who wished to see them form part of the daily bill of fare must have been keenly disappointed, for, to the credit of Conference be it said, the "scenes" were few and far between, and by no means extraordinary in their character. And there is this to be said—those who took part in them have very little reason to congratulate themselves upon the success attending their efforts. Harsh things were said, it is true, but by a few only, and possibly even these will profit by experience as time goes on.

The Reception at Cambridge. The representatives must have been completely satisfied with the cordial welcome given to Conference by the university and municipal authorities. The Vice-Chancellor and the Mayor vied with each other in saying kind things, the representative of the university of seven centuries welcoming those present as brothers, and as fellow-members of the great teaching profession. That Dr. Hill was thoroughly in earnest in all he said was evident from his attitude to the Conference throughout the week. In my fairly-long connection with the Union I do not remember anything more gratifying than the large-hearted welcome extended to all by the Vice-Chancellor. I know it was his desire to do more than the limits imposed upon him by the Conference agenda enabled him to perform. But for the fact that every moment of the week was taken up with one engagement or another, the representatives would have had a further welcome from Dr. and Mrs. Hill. As it was, they dispensed their hospitality in more ways than one, and to as many as could conveniently be included.

The President's Address. Mr. Clancy's address was just what those who knew him expected it would be. "Disappointing" and "reactionary" it may have been to those who believe there is nothing good outside the Board School system; but to the educationist who is willing to acknowledge good work from whatever quarter it may come, the address was an acceptable and a praiseworthy effort. There was no beating about the bush. Throughout there was a demand for fair play for the denominational school. "Speaking as a Catholic," he said, "who can tolerate no compromise on the question, I say that nothing but Catholic teaching to Catholic children will satisfy our body. To all other denominations I would grant similar rights. Let us have denominational schools for those who need them, and non-sectarian instruction for the parents who believe in that system." A large number of those who heard the address no doubt differed from Mr. Clancy on this point, and it is certain that many of the leading dailies were indignant. But, after all, it is a fine thing that the Union is broad enough and tolerant enough to allow a president to state his opinions boldly and without fear. His demands for the emancipation of the child worker, for better school attendance, and for reasonable security of tenure for the teacher, deserve, and will no doubt compel, attention.

In dealing with Superannuation, the president was good enough to refer to my own services in that particular branch of the Union's work. I am, of course, grateful to him, and I am especially glad that he paid a well-deserved compliment to Messrs. Yoxall and Gray, to whom we are in a great measure indebted for the Superannuation Act of 1898.

The Contest for the Vice-Presidency. No one was surprised to find Mr. Jackman the successful candidate, though everybody expected that Mr. Blacker would run him very closely. Mr. Horobin did exceedingly well, polling over 6,500 votes. There are many who refuse to support a candidate who is no longer engaged in elementary school teaching. This is unjust and ungenerous, especially when we remember Mr. Horobin's past services and his present sphere of work. I trust that members of the Union generally will do justice to a man who has served them well for many years. His labours, too, in connection with the Cambridge Conference should not be forgotten. Mr. John is so popular that his success is only a question of time; and with respect to Mr. Peaker, all I can say is, that those who heard him at Cambridge must admit he is a coming man, if indeed he has not "come" already.

Many of us have not agreed with Mr. Jackman in the past, but we are all prepared to say he is a hard worker and a devoted Unionist. I congratulate him most heartily, and wish him all the health and happiness he can desire for himself. If he is at times a determined opponent, he is at least honest and straightforward. I am confident he will do his duty in manly fashion, and be equal to all the demands made upon him.

The Debates. I am not sure that the Conference has "discovered" any new debater. Possibly the opportunities were few. One is bound to admit that the Executive members have most of the chances; but can this be avoided? From the very nature of the business, those on the platform are best qualified to place the Union case before the representatives and the country; and that being so, there is perhaps little chance for those "on the floor of the House." Yet, in years gone by, men somehow or other forced their way to the front in spite of all this. On this occasion Mr. Hearn of Finsbury was the bright particular "star," and he certainly made the most of his excellent opportunities. There were others who made a favourable impression; but, what

with the platform, the closure, and the crowded agenda, many must have returned disappointed. Numerous good things were said, but I do not include among these the following from a lady representative: "I am not going to be modest," and, "I have taken my gloves off, so you see I mean fighting." These were unfortunate slips which I do not think we shall hear again. We had a capital discussion on Infants' Schools, led off by Mrs. Lewis, L.L.A., Leeds, and Miss Fleming, Leeds; and a really full-dress debate on "The Financial Support of Education," Dr. Macnamara moving: "That whilst expressing gratitude for the efforts of benevolent societies and individuals in the past as voluntary subscribers in support of public education, this Conference is of opinion that the time has now come when the whole of the finances necessary for the support of public education should be provided from public sources, and should be expended subject to public control." Later on we had the Finsbury resolution, which provided for (1) the formation of an education authority in each county; (2) a county rate for educational purposes; (3) aid for all schools from (*a*) a parliamentary grant and (*b*) a county rate; (4) the proper management of voluntary schools receiving aid from the parliamentary grant *and* the county rate.

It is worth recording that in the course of this debate *Ad Hoc* was once more thrown overboard, on this occasion by an enormous majority. On Wednesday afternoon Mr. Waddington's resolution *re* the Half-Timer was carried unanimously, after which we dealt with "Employment after School Hours" and "Reasonable Security of Tenure." The question of the appointment of Mr. A. A. Thomas, B.A., as Secretary to the Examinations Board was very keenly debated; but Dr. Macnamara's speech in favour of the new departure settled the business, and Mr. Thomas is now, or soon will be, an official of the Union. As I said in a former note, Mr. Thomas is the right man for the post, and Conference will gladly admit this in the course of a year or so.

Superannuation and the Draft Rules. A Conference agenda without "Superannuation" as an item would be a decided novelty. For many years it has occupied a place of honour, and for about eight or nine years I have had the pleasure of moving the Executive resolution on the subject. On more than one occasion, I confess, I have not faced Conference with any degree of pleasure. One had little to report in the way of progress, and there was always the danger of the representatives beginning to lose faith in the workers.

However, with the exception of a few protests now and then from those who do not view the present scheme with any favour, we have no cause to complain of our treatment. And now it was my privilege to announce formally to the Conference that our labours had borne fruit, and that the Superannuation Bill was law. The Draft Rules have recently come in for severe criticism—a treatment they apparently richly deserved. But I was able to assure my hearers that the inquiry into an applicant's pecuniary circumstances would not apply in cases where the teacher's position was due to his own thrift. That, at least, is the assurance conveyed to us.

I should like to acknowledge here, if I may be permitted to do so, the many kindnesses I have received on all hands in connection with this important subject. The hundreds of letters that have come to hand will always be preserved in "sweet remembrance." May I say, too, that I am grateful to Conference for the feeling which led the great gathering to pay me the compliment of "three cheers" at the conclusion of my speech. I had left the platform and the hall at the time, but I heard the cheering, and I take this—the first—opportunity of expressing my gratitude for this special mark of good will and appreciation. It may never be my privilege to address Conference again on Superannuation, but as long as I live I shall treasure the many kind things said and the many kind things written. May all my readers live to enjoy the improved pension which will certainly come with time, and with agitation on the right lines.

The Honorary Degrees. Every member of the Union rejoices that the president and secretary have been selected by the University of Cambridge for the degree of M.A. *honoris causâ*. The ceremony was probably one of the most impressive those present had ever witnessed, whether the mind turns to the general scene, or to the Latin oration of Professor Jebb, or to the "supreme moment" when the Vice-Chancellor, taking Mr. Clancy and Mr. Yoxall by the hand, declared each of them to be a Master of Arts. The honour is an honour to the Union as a whole. As one of the speakers at a subsequent function remarked, there is not a teacher in the smallest school in the most remote village who will not feel that a compliment has been paid to the profession of which he is a member, and therefore paid to himself.

The Papers read. As a rule, a paper on some important subject is read by a prominent member of the Executive. On this occasion we had two papers—one by Mrs. Bryant, D.Sc., on "The Work of Women in Education;" and the other by Professor Jebb, on "Primary and Secondary Education." Need I say with what delight the Conference listened to these distinguished scholars? Mrs. Bryant was by no means a slave to the "copy" in front of her. Now and again she addressed her hearers on some point that required elaboration, and then returned to her reading. It was an almost exquisite performance. I did not hear the whole of Professor Jebb's paper, but I have seen it in print, and believe it will give general satisfaction. At any rate, Conference cheered Mr. Yoxall very heartily when he voiced the thanks of the meeting.

Purse Day. As I have already said, we have to thank Dr. and Mrs. Hill for many favours received during the Cambridge week, not the least of them being their presence and help at the Purse Day function. No representative in that room, I am certain, felt happier than they did when the splendid total of £8,000 was announced. And this by no means represents the gross total, including the special "London effort." Mr. Horobin, indeed, informed me before I left Cambridge that he hoped to see £15,000 reached, and that, as a matter of fact, something like £14,500 had been already paid in or guaranteed.

It may be bad taste to hold up these figures for the general public to gaze at, but one may be pardoned for feeling proud of belonging to a profession that can raise such a sum for charitable purposes. I am told that London may be trusted to raise the £10,000 required for the new orphanage, and I believe it. Hackney carries off the shield for the highest "grand total," and Westminster for the highest "average sum per member."

I cannot in a short note do anything like justice to this delightful afternoon—the ceremony of presentation, the music, or the speeches—but I congratulate Mr. and Mrs. Horobin upon the success attending their efforts; and if I omit other names deserving mention, it is owing to considerations of space.

The Dinner. My limit is, I fear, already exhausted, and I have not yet dealt with some of the most important gatherings of Conference week. Whatever happens, and though the Editor shakes his head, I *must* say a word as to the dinner. We were at once reminded of Oxford; for the dinner itself, the serving, the music, the grand hall, and the magnificent speeches, sent us back in imagination to our visit to the sister university in 1894. The organ of the Union, reporting the gathering, calls it "A Brilliant Function in Trinity College Hall." I am not disposed to quarrel with the description. The speeches were remarkably good, that of the Master of Trinity being perhaps the gem of the evening. Of course the teacher M.P.'s did themselves justice; we expect elegant little speeches from them whenever they represent the Union, and we are never disappointed. The Vice-Chancellor and Dr. Jebb were both excellent, as we all thought they would be; and Dr. Macnamara was in his best vein in proposing the toast of "The Ladies." Speaking of the ladies outside the Union, the speaker said: "Look at the strong arm they (the N.U.T.) could put around them—he meant the legal-defence arm, of course. They might help them, too, to decide the psychological moment at which it would be best to move

The next paper in the Series of
ILLUSTRATED VISITS TO POLYTECHNICS AT HOME AND ABROAD
will appear in our June Number.

'That the question be now put.'" It is only giving Dr. Macnamara his due when I say that the toast of "The Ladies" has never been so ably proposed at any Union gathering as it was on this occasion. The charming speeches of Miss Hughes and Miss Cleghorn in reply will not soon be forgotten by those who had the privilege to hear them.

The Cambridge Conference will compare in interest and success with any in former years, and surely that is high praise indeed. I am quite certain we shall want to go to Cambridge again. Can I say more to show our appreciation of all that was done to minister to our comfort and complete enjoyment!

EDUCATIONAL NOTES.

BY CATHERINE I. DODD,

Owens Day Training College, Manchester.

The Kindergarten Child—Keswick Museum—Oxford Summer Meeting—"The Paidologist."

The Kindergarten Child. MARION CARTER gives an unpleasant account of the kindergarten child in the March number of *The Atlantic Monthly*. She says that when free kindergartens were started in some of the large American cities, fifteen years ago, the teachers of the primary school "looked forward to a pedagogical millennium." Surely that was unwise of them: every earnest teacher knows how far we fall short of the ideal in even our most encouraging experiences, and a sense of incompleteness mars our highest triumphs.

The teachers waited impatiently for the first batch of kindergarten children. "They came expecting to find in us lovely ladies, who would call them 'Freddie dear' and 'my little Agnes;' they came expecting to be praised for every trivial act or piece of work; they came expecting to do exactly as they pleased at any hour of the day, and to be entertained at every hour of the day. They were disappointed—and so were we."

The writer says the primary teachers could no more pour forth streams of adulation for ordinary acts upon the part of the children than they could address them as "dear" and "darling" every time they spoke; hence their sympathy and affection were questioned. This is surely an exaggeration, and argues at least a want of harmony between the kindergarten and the primary teachers.

The lessons were met with distrust by the children. Freddie protested that copying letters on the blackboard was work, and added that "in kindergarten we don't *work*; we *play*."

The reading lessons were received with criticism by the children, on the score that they were not interesting, and they wanted stories about "a C with his mouth open like a big fish to catch a little fish; and A that's the door of a tent with soldiers inside."

The children carped at the arithmetic, expecting the teachers "to conceal the dry arithmetical operations in entertaining tales of sticks of candy, cake, and oranges." It appeared that in the kindergarten, volcanoes and the like had been made interesting by cotton wool soaked in alcohol concealed in a pile of sand and lighted; and when the primary teachers began to give information on gulfs, capes, and bays, the children wearied, and demanded "fireworks."

The sewing and outlining cards, the clay modelling and paper-folding, are derided by the writer. She complains: "We were obliged to waste a precious hour a week 'sewing' pictures, to appreciate which would have implied an elevated taste in a Hottentot only." The kindergarten games bored the teachers, and so did the children's rhymes and stories of flowers, birds, and animals.

Children love analogies, as every thoughtful teacher knows, and these children had been encouraged in the kindergarten to express accidental resemblances: for instance, "flowers were called fairy cradles," "seeds were called baby plants," and the like. The children's faculties for seeing resemblances enraged the primary teacher, and when Freddie declared his three leaves were "three little boats," and Ethel said hers were "a papa, a mamma, and a baby," the teacher's rage became pronounced. Sternly she commanded the little ones to hold a leaf in their hands. Then she began: "Children, this is *a leaf*. *This is* a leaf. What is in your hands?" They replied meekly enough. "Children, this leaf is *green*. What colour is this leaf?" And so on.

"When our rage was spent," continues the writer, "and we rested from our labours, it was with the consciousness that, for once in their lives at least, the kindergarten children had called an object by its right name, and had made plain, cold statements concerning it."

Lastly, Miss Carter complains that the children's minds were filled with masses of "inaccurate or incorrect information." (Poor mites! did the teachers really expect cold, precise, scientific facts from kindergarten babes?)

Freddie's bragging propensities were certainly trying, but a wise teacher can soften even a child's self-assertion without much bitterness. When a whale was under discussion, Freddie remarked grandly that he had "learned lots and lots about fishes in the kindergarten," and he lost no opportunity of asserting, with regard to every subject, that he had "learned all about it in kindergarten." The experiment appears to have ended in dismal failure, and the writer concludes: "It was borne in upon us that our abilities were not such as to enable us successfully to develop in the primary school the flabby kindergarten intellect of the kindergarten child."

The situation shows mistaken zeal, unwise enthusiasm, and want of knowledge of true Froebelian ideals and principles on the part of the young kindergarten teachers; but surely the first year's work ought not to be judged harshly. It also shows narrow ideals, scorn of new lights, impatience, want of sympathy, and lack of pedagogical knowledge on the part of the primary teachers. We are glad to know that this incident happened fifteen years ago, and we venture to think that if Miss Carter had studied the kindergarten developments during these years, she might have written with less bitterness.

Keswick Museum. The little local museum at Keswick seems to me to be most admirable for keeping green the literary associations and giving information on the environment of the Lake District. One could not help wishing that every town and village in the country had such a museum, and that all school children were made thoroughly familiar with the exhibits. The little terra-cotta room with the blue-tiled hearth, containing literary relics, reminded one of the Goethe and the Schiller rooms at Weimar, without the unpleasant associations of death masks and decayed wreaths.

The Wordsworth corner contained various portraits of Wordsworth, and pictures of Cockermouth, where he was born, and Grasmere, where he died. There were also portraits of Dorothy Wordsworth, his sister; Dora Wordsworth, his daughter; and Mary Hutchinson, his wife; and a case full of Wordsworth's letters and MS. sonnets.

Southey relics were numerous: he lived at Keswick, in Greta Hall. His best blue china and his heavy clogs were preserved, amid many letters and MS. poems.

There were also Coleridge relics—portraits of the Coleridge family, Hartley Coleridge as child and old man, and Coleridge letters and manuscripts. Among the other portraits were Matthew Arnold, Harriet Martineau, Charles Lamb, De Quincey, and Ruskin. All were associated with the neighbourhood, though Lamb only as a visitor. Among the manuscripts was Arnold's *Sohrab and Rustum*.

The larger hall was bright and pleasant and full of interest. Cases of local birds and bird eggs, butterflies and moths, and various wild animals, including several foxes, were carefully arranged, and made it easy for an amateur to begin to study the animal life of the district.

Specimens of slate, granite, sandstones, crystals, stones used in jewellery, fossils, graptolites, etc., invited one to study the neighbouring geology, and a case of botanical specimens gave help to the young botanist.

A relief map of the district, made out of an Ordnance Survey map, and a large painted model of the Lake District, gave visitors a clear idea of their geographical surroundings. There were also old weapons, coins, swords, pottery which

had been found in the district, and old bolts, bars, tankards, and an alms-dish and whisky-keg from Furness Abbey.

There were many beautiful wood-carving and beaten copper and silver designs, lent by South Kensington to be copied by the members of the School of Industrial Arts.

School journeys in the Lake District, with lessons in the museum, seem to be very fascinating possibilities.

Oxford Summer Meeting. The programme for the Oxford Summer Meeting for 1899 is now ready.

The main courses of lectures are designed to carry on the sequence of study arranged for previous meetings. These lectures illustrate the history, literature, art, economics, and science of the period 1837–71.

There will be special lectures on Hellenic Studies in the Nineteenth Century, and special classes in education, English language, Greek and Latin, moral philosophy, geology, and biology.

All inquiries may be addressed to the Secretary, University Extension Office, Examination Schools, Oxford.

"The Paidologist." The first number of *The Paidologist*, a magazine devoted to child study in Britain, is just issued. It will be published three times yearly. Next month its contents will be discussed. The annual subscription will be 1s. 6d. Inquiries respecting it should be addressed to Editor of *The Paidologist*, Cambray House, Cheltenham.

EDUCATION IN SCOTLAND.

E.I.S. NOTES, ETC.

BY JAMES PATERSON,

Ex-Vice-President of the Educational Institute of Scotland.

S.A.T.A.: Fifeshire Branch. The annual meeting of the Fifeshire Branch of the Scottish Assistant Teachers' Association was held in Kirkcaldy—Mr. D. B. Low, president, in the chair. The secretary's report showed that the membership had slightly decreased, owing to the large number of changes that had taken place during the year. The president, in the course of his valedictory address, referred to the passing of the Superannuation Act as the most notable event of the year, and criticised it on the usual lines. He noted the fact that School Boards having a definite scale of salaries had less difficulty in obtaining suitable teachers than Boards having no scale, even when the latter offered higher initial salaries. The evils attending large classes, and the benefits of school libraries, were also dealt with. In concluding, he stated his opinion that in the past full recognition had not been given to the value of the work of the assistant teacher.

Renfrewshire Branch, E.I.S. At the meeting of the Renfrewshire Branch of the E.I.S., held on the twenty-fifth of March, an interesting and practical psychological paper on "Suggestion" was delivered by Mr. John Adams, M.A., B.Sc., Rector of the Glasgow Free Church Training College. Suggestion, said the lecturer, is the calling up of one set of ideas by another set, and this power is entirely beyond the control of the person acted upon. As an instance of this, one can call up any familiar quotation in the mind of another by merely repeating the first few words of it, the hearer involuntarily supplying the rest. The function of the teacher is to suggest, and his constant endeavour should be to suggest to different minds in different ways. It was most useful to find out amongst children those who responded to suggestion best by sight, those who were most susceptible to sound, and those who responded more to touch. The more ideas a man had, the better could he respond to suggestion.

New Methods of Teaching Drawing. To a largely-attended meeting of the Dundee Branch of the E.I.S., lately held in University College, Mr. David S. Murray, Art Master, Morgan Academy, read a paper on "New Methods of Teaching Drawing." In Mr. Murray's opinion recent changes tended towards making drawing, especially on the art side, more practical and educative. The new scheme developed the inventive faculty in certain pupils, and a good sense of colour in others. He demonstrated how the inventive faculty inherent in children could be stimulated and developed by a system of instruction in freehand drawing, including geometrical pattern drawing, brush drawing, clay modelling, and cardboard modelling. By means of diagrams he showed that the most intricate design has its simple elements, and that the most fascinating combinations of colour and form may be evolved from the child's sixpenny box of paints.

Dalkeith Branch, E.I.S. There was a large attendance at the March meeting of the Dalkeith Branch of the Institute to hear Mr. Charles Macdonald, M.A., Leith, discourse on "The Assistants' Programme." Mr. Macdonald dealt with what he considered the grievances of the assistant teacher, and advocated the adoption of the principle of grading by School Boards, the extension of School Board areas, the appointment of departmental masters, the abolition of "back-door" entrances to the teaching profession, and the limiting of the supply of pupil teachers. Mr. Macdonald was thanked for his paper, and a social meeting of an enjoyable nature followed.

University Training of Teachers. The Local Committee for Aberdeen invites eligible candidates for university training to apply. Candidates must, before beginning attendance on university classes in October next, have passed the preliminary examination in arts or science, or an examination recognised by the university as equivalent thereto; and if already students in arts or in science at the university, they must have not less than two years of their graduation course to run. Queen's students, as they are called, will receive grants—men, £25 each; women, £20 each—for two or three years. The Edinburgh E.C. and F.C. Training Colleges announce that they have reserved a certain number of Queen's studentships on similar conditions.

E.I.S. Deputation to London. The deputation sent to London by the Educational Institute on the subject of the Superannuation Act did not meet with much success, little hope being held out of the likelihood of the deletion of the clause forbidding School Boards to supplement the pension under the Government scheme. The Superannuation Committee is, in consequence, now concentrating its efforts mainly on an attempt to get a sum of money set apart from which pensions to existing teachers might be supplemented to the maximum possible for new entrants. Captain Sinclair's Bill for raising the age limit of school attendance was also pressed on members of Parliament by the deputation, but it also is considered to have little chance of passing during the present session.

A Diploma in Education. At the monthly meeting of the Aberdeen Branch of the E.I.S., Dr. William Dey read a paper on "A Diploma in Education." In speaking of a teacher's diploma, Dr. Dey kept in view the whole body of teachers, both in elementary and in secondary schools. Public opinion, he said, had not yet shown sufficient appreciation of the high qualifications that fully-trained teachers ought to possess. Considering the course of training necessary for gaining the diploma, he stated that it should consist of two parts, and embrace a general education and a specialised education, or professional training bearing directly on their work as teachers. General education should include such a curriculum as would be followed by a degree in arts or in science. A professional training in the widest sense of the term must be based on a sound knowledge of physiology and psychology. The teacher should never cease to be a learner. Such a diploma as that referred to would, in the lecturer's opinion, wield a powerful and far-reaching influence in increasing the number of successful teachers.

Glasgow Branch, S.A.T.A. The annual business meeting of the Glasgow Branch of the S.A.T.A. was held in the Religious Institution Rooms—the president, Mr. Hugh MacCallum, M.A., in the chair. Mr. MacCallum, in a short address, congratulated the members on the greater recognition of their efforts to improve their own position and that of education in Scotland. Office-bearers for the coming year having been elected, Mr. Small, the new president, emphasised as questions requiring the careful consideration of the members the development of the departmental system, the creation by that development of a higher position for women in elementary schools, and the recognition that the intro-

duction of the system in large centres would not materially affect the position of those who of necessity must be permanent assistants, and whose salaries, therefore, should be sufficient to enable them to maintain a proper social position, and also to keep themselves up to date in educational affairs.

The New Code. The New Scotch Code is generally admitted to be a great advance upon all its predecessors, but some of its details might with advantage be modified. The matter of registration is a case in point. It is quite possible that there may be found in one class—in the junior, if not in the infant division—children (*a*) under 7, (*b*) between 7 and 10, and (*c*) over 10. Such a multiplicity of registers, coupled with the constant transference from one register to another, will assuredly prove troublesome and irksome. It is difficult to see what the age of the children in the several divisions should have to do with the grant payable, and there seems no good reason why there should not be a fixed grant per head on the average attendance of all pupils under the Merit Certificate. If the grants must be paid according to age, it would be a great relief to be allowed to place in the several registers at the beginning of the school year all scholars who will reach the various ages in the course of the year.

The Spread of Books and Periodicals. The Dundee Branch of the Institute had the pleasure the other Saturday of listening to a paper by the Rev. D. B. Cameron, on "The Spread of Books and Periodicals." After speaking generally on the question, and on the position and influence of libraries, Mr. Cameron said that book-making had become a trade, and that literature was no longer cultivated on a little oatmeal, or, for its own sake, on any fare whatever. He advocated the establishment of a library in every school, under the supervision of the teacher, and carefully selected to suit the different ages and attainments of the pupils. The prevalent idea, that what is most to be desired is to teach boys and girls how to get on, was false. The object of education was to draw out and develop all the powers and faculties of the mind.

Dismissal at Lerwick. What seems, from all accounts, a gross injustice is being perpetrated at Lerwick, by the dismissal of Mr. Robert Young, M.A., who has for the past five years discharged efficiently the duties of rector of the Anderson Educational Institute. Some six months ago a motion was brought forward by a member of the School Board to dismiss Mr. Young, but this action aroused such strong opposition amongst the ratepayers that the motion was withdrawn. Nothing more, publicly at least, was heard of the matter till the last monthly meeting of the Board, when the same member again tabled his motion. A committee of ratepayers, opposed to what is generally regarded as an act of injustice towards the rector, was immediately formed, and steps were taken to ascertain the views of the electorate on the matter. A petition disapproving of the motion was sent round, and was signed by eighty per cent. of the ratepayers. The parents and guardians of the pupils also presented a petition bearing the names of all except four. The motion, notwithstanding, was proceeded with, and carried by five votes to three; whereupon the clerk was instructed to intimate to Mr. Young that his engagement with the Board would terminate at the end of three months. The action of the Board has aroused great indignation throughout the county, and the universal feeling is one of sympathy with Mr. Young.

NOTES FROM THE NORTH.

Superannuation. For the last three or four months the various associations of teachers throughout Scotland have been discussing the Elementary School Teachers' Superannuation Act of 1898. Probably with regard to no Act passed within recent years has so much unqualified dissatisfaction been shown, and, as the time of option for existing teachers approaches, it may not be out of place to refer to the more important points to which attention has been directed. If any one has expressed thankfulness, it is because the principle of superannuation to teachers has been at length, and after much struggle, conceded.

Most of the discussion has ranged round the following points:—

1. The restoration to School Boards of the power of granting supplementary pensions.
2. Increase of Treasury allowance.
3. Lowering of pension age.
4. The admission of secondary school teachers.

There can be little doubt that much of the imperfection in the Act is due to the fact that it was taken up at the fag-end of the parliamentary session, and when there was little time and less inclination to discuss fully some of its more important provisions.

Supplementary Pensions. Scotland, too, it is felt, is in a somewhat different position in this matter from England. Retiring allowances in some cases by no means illiberal have been granted by School Boards under the Scottish Education Act of 1872. This is particularly the case with regard to the older and more highly-paid teachers both under city and country School Boards. In the case of the "old parochials," pensions are a certainty. By a minute dated March 27, 1899, we note with satisfaction that "a limited number of pensions will be granted to teachers who were employed in that capacity as principal or assistant teachers at the date (August 6, 1872) of the passing of the Education (Scotland) Act, 1872."

Those teachers, however, who accept the Act of 1898 are prevented by Section 12 (5) from receiving any pension from School Boards in addition to the one granted under the Act.

On this point Mr. Bryce, M.P. for Aberdeen, said to a recent deputation on the subject: "The School Board is a public body responsible to the ratepayers, and if the School Board wishes, where it considers exceptionally good service has been rendered, to recognise the service, I think the Board should have the power to do it. I do not see why the Government should refuse to grant to the Board such a power." This we believe to be the attitude of by far the greater number of the Scottish Members of Parliament, and we refuse to think that this privilege was taken away in a spirit of revenge on the Institute because of its recent action on dismissal cases.

Sir Robert Finlay, M.P., Solicitor-General for England, said to a deputation who waited on him at Inverness lately: "As to School Boards supplementing pensions under the Act, before saying anything definite on the point one would like to have a thorough expression of opinion on the part of School Boards, and those whom the School Board represented."

This, we have reason to think, is the official attitude on the subject. Up to the present no decided opinion one way or the other has been given by School Boards.

As the Act at present stands, there can be little doubt that, so far as it refers to the older teachers, it is very hard, not to say unjust, and we feel pretty certain that very few of the Scottish teachers who are within fifteen years of sixty-five will have anything to do with it. Now, the purpose of the Act is to allow these teachers to retire, and give place to younger and more energetic ones, so that the present generation of children may receive the very best education possible. Does not the Act defeat this object? Is a man to be compelled to retire at sixty-five on a pension of a little over £40, when, by not accepting the Act, he may, by remaining at his work a year longer, receive a salary equal to from five to ten years' pensions?

Some Statistics. If we take the figures of the Blue Book (1898)—which, be it noted, are really the figures for 1897, and which, in the case of the men teachers, are considerably under those of the present time, on account of the great and increasing dearth—we find that the average salary for a head-master is over £170 in Scotland; while there are, of the 2,338 head-masters, 655, or nearly one-third, with salaries of £200 and over. These are asked to retire on a little over £40. Is it not irony? In Scotland, too, there are 171 head-masters with salaries between £300 and £400, 53 between £400 and £500, 11 between £500 and £600, and 2 over £600.

It is true that there are 365 who receive salaries between £50 and £100; and though a great many of these have free houses, and not a few are younger men, even in their cases it might prove a hardship.

If we take the case of the male assistants, we find that 910, or nearly one-half, have salaries ranging from £100 to £300; and, as we have noted above, these are on the small side, inasmuch as an assistant in Scotland can now readily command, when he leaves training college, a salary of £90. Even in the case of assistants, the pension is inadequate, if School Boards are deprived of the right of supplementing.

The matter for head-mistresses and female assistants stands in much the same position, as might be proved from figures.

Efforts are to be made, we understand, to induce the Government to lay aside by a Treasury Minute—for a new Act is not considered feasible—a sum of money to supplement the pensions of the older teachers, so that they may at least approximate to the maximum of what a new teacher may receive—namely, £70. Even this is not enough, we think.

Multiple Contributions. If School Boards are not to be allowed to supplement, why should the Government not allow teachers in the possession of good salaries to contribute in multiples of £3 or £2, and receive a corresponding pension up to two-thirds of their present salaries? For example, at present by paying £3 a year a teacher who is fifty years of age may receive ultimately about £50; why not allow him, if he has a salary of £225, to pay in £9 and receive a pension of £150? Would this alter the basis of calculation? In view of the fact that it is expected that in the near future the pensions will be handsome to new teachers because of the number who will pay in and receive nothing, we do not think it would.

House of Commons Return. At all events, the following figures, taken from a return ordered for the House of Commons, are suggestive. On April 30, 1898, there were in Scotland, in state-aided schools, 79 male teachers over sixty-five years of age. This is equal to 1½ per cent. of the 4,223 male teachers; while of female teachers over sixty-five, out of 5,667 there were found only 2. What percentage this is we leave our readers to calculate. It may be noted here, in connection with the lowering of the pension age, especially for women, that the Government in making this return asked for the number of female teachers over fifty-five. The number was 82, so that it would seem as if the age for retirement in their case should be fifty-five, or rather that they might be given the option of retiring at that age if they desired.

If the money devoted to the fund formed by the teachers' contributions cannot be diverted from its original purpose, it appears there will be an increasing chance of a good pension both for the younger and the future teachers. But this is, of course, contingent on a great number accepting the pension scheme and not reaping the benefits thereof.

Secondary Teachers and the Act. With regard to the admission of secondary teachers to the benefit of the Act, there seems every possibility of this taking place at once. In Scotland there is no line of demarcation between the various schools, and teachers from the one class of schools are continually crossing to the other. In fact, the restriction might in the end lead to serious difficulty in the staffing of the higher-class schools, as teachers, having begun in elementary schools, and having contributed to the pension fund, would be somewhat chary of transferring their services to secondary schools, when they would lose all. Scotland, again, in this matter is in a totally different position from England. There is no comparison possible between the two. The *Teachers'* Superannuation Act is the short and, we hope, the correct title.

It is with satisfaction we learn that there is likely to be a liberal interpretation made with regard to many vexed points, particularly that ladies who have contributed to the fund, and leave it for better situations, shall we say, will at the age of sixty-five obtain a pension in proportion to the years they have contributed; and it would seem as if this were also likely to hold good in the case of male teachers who desire to retire at sixty. Then, again, the "poverty" draft rule is not to be so stringent as was at first believed.

Leaving Certificate Examinations. The Leaving Certificate Examinations will begin on Monday, June 19. Teachers should note, therefore, to send Form H 1 at once to the Department. With the exception of Science, the examinations are to be conducted as in former years. Special instructions are to be sent out as to the method in which the Science examination is to be conducted. With reference to Circular 236, issued in December last, it is now explained that candidates may be presented only in Arithmetic and English, provided some of the candidates are presented in one or more of the higher subjects of education, and when the Department have agreed to hold an examination. It is to be observed in this connection that Circular 236 says that the presentation of pupil teachers from the school in higher subjects will not meet the requirements of this rule.

Registration. The New Code, with its division of the school into departments, according to an age classification, has necessitated a new method of registration. Circular 250 (6th April) explains the system, which is to apply to all school years, commencing on or after May 1, 1899.

The more important alterations are in regard to the attendance, and, as a result, to the Summary Register. Separate registers are to be kept for—

A. Higher-grade schools or departments.
B. Advanced departments—pupils who have obtained the Merit Certificate.
C. Pupils in lower departments, separated for—
   1. Pupils under three.
   2. Pupils between three and seven.
   3. Pupils between seven and ten, and
   4. Pupils over ten (who have not obtained the Merit Certificate).
D. Pupils receiving practical instruction.

In the circular accompanying the regulations for registration, the Department say:—"As regards the lower departments of the school, it will be observed that the only registration which my Lords have thought fit to insist upon is that which is necessary for the calculation of the grants under Article 19 B, and that it has reference solely to the *classification of the scholars according to age*, and not according to the divisions in which they are placed for purposes of instruction. They have thus restricted their requirements, with a view both of simplifying registration and of removing every possible obstacle to the free transference of the scholars from class to class. In special Infant Departments separate registration will be required for the attendances of children under and over seven years of age respectively; but their Lordships are strongly of opinion that children over ten years of age ought not to be found in these departments, and consequently no third register should be required."

Is the New Registration Simple? We fail to see the simplification of registration here talked of; the complication is serious. Not only will it be impossible to do with only two registers, but in some cases four will be required. In city schools, for example, there will be found in the Infant Department children under three sent to school to be out of the way of their parents, and in the same department there will be pupils over ten. If the classification is to be according to attainments, such must be the case. The Department is pleading for a free transference from class to class for the purposes of instruction, yet they are placing obstacles of no light character in the way. Similarly in a class corresponding to Standard II. it will be necessary in many cases to have three registers.

Could not the Department have struck an average normal grant for all pupils below the Advanced Department? With the statistics at their disposal, such should not have been a difficult matter. It is not too late yet, for by so doing they would remove all this difficulty with regard to registration. One fixed grant must come, and strenuous efforts should be made by teachers to realise that consummation so "devoutly to be wished."

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EDUCATION ABROAD.

BY E. E. FOURNIER D'ALBE, B.SC., A.R.C.S.

THE question of the abolition of Latin and Greek in favour of modern languages is being earnestly debated among the Teutonic nations. That Norway has altogether eliminated the teaching of dead languages in schools under State control may perhaps be accounted for by the position of Norway, which, of all European states, is least in contact with the Latin countries. The teaching of Latin as a key to the modern Romance languages is of more obvious utility in Germany and Austria. Denmark appears to be on the point of following the example of Norway. In Prussia, also, the modern movement for reformed schools tends in the same direction. But in this case it is not only economy of time which is aimed at, but the levelling up of the elementary school to an equality with the secondary school—the equalisation, in fact, of all ranks, so far as the first years of education are concerned. The Prussian Education Department has already given way to the extent of converting a number of "gymnasia" into reformed schools; but this tendency has been somewhat checked by the prevailing conservative reaction.

* * * * * *

As regards the general question, the utility of classical studies much depends upon the object to be attained. If commercial supremacy is aimed at, the extensive acquisition of living languages is a powerful weapon, since every one prefers to bargain in his own language, and foreigners are thus most easily and successfully approached. But even here the advantage of a preliminary acquaintance with Latin is of value as far, say, as French, Spanish, and Italian are concerned. On the other hand, I do not think that the Latin scholar is, as a rule, the best modern linguist. The best linguist is, and has always been, he who acquired the use of two spoken languages in his early youth, and this circumstance accounts largely for the facility with which the average Belgian or Swiss acquires any additional language he takes up. Those who are brought up in a bilingual atmosphere are the first to break down the barriers between nations of different tongues. Considering the way in which modern languages are most widely taught, they might as well be dead languages; and it is a question whether it would not be better to retain Latin and Greek for home use, since they have at least the advantage of a universally-diffused literature, and are used in an all but universally-accepted system of scientific terminology.

* * * * * *

The *Allgemeine Deutsche Lehrerzeitung* advocates the increase of the subvention of £7,000 which is annually voted by the Reichstag for the maintenance of German schools abroad. France pays some £40,000 annually for a similar purpose, and Italy £80,000. The consequence is that French and Italian are the almost universal languages of the Mediterranean basin and the near East, as British administrators at Cairo are well aware. French is even now the official medium of instruction in most of the Turkish higher schools. On the other hand, English is regarded as the universal language of commerce, and as such has a great advantage over German. German travellers often complain of the easy arrogance with which Englishmen make themselves at home even on German ocean liners, and set the fashion in everything. Foreign, and more especially the less civilised nations, do not believe in the power of an empire whose citizens have to use the language of a neighbouring state in their diplomatic or commercial intercourse. Hence the demand for more German schools, for the prosperity and greater glory of the Fatherland.

* * * * * *

The first public function performed by Lord Curzon in Bombay was to receive a deputation representing the Provisional Committee for carrying out Mr. Tata's scheme of an imperial university for the development of post-graduate education. Mr. Jamsetjee N. Tata has offered a property representing a capital of thirty lacs of rupees, and calculated to yield a yearly income of about one and a quarter lac. The scheme worked out by the Provisional Committee comprises scientific and technological, medical and sanitary, and educational and philosophical departments. The initial expenditure comes to about fifteen lacs, while the annual charge in the three departments will require three lacs of rupees; hence the Parsee merchant's princely gift will have to be trebled before his generous project is carried out. The committee looks to the native princes and the supreme government to supply the deficiency. Lord Curzon expressed warm sympathy with the project, but also some doubt as to whether a sufficient number of students could be found to fill the classes of the first-rate professors to be engaged, and, if so, whether the supply of highly-trained men would not exceed the demand. On both these questions sanguine views were expressed by the committee.

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Professor Mieille, of international correspondence fame, has made some bold suggestions for improving the "boys' barracks" which go under the name of *lycées*. These secondary schools of France have conspicuously failed to produce that *mens sana in corpore sano* which is the foundation of a strong and vigorous manhood and nationhood. In the first place, he proposes to put the elementary classes entirely under the management of female teachers. This proposal may have something to do with a recent unpleasant incident; but the arguments brought forward give an independent weight to it. "It has been found that pupils educated by women are gentler, more polished, less turbulent, and less noisy. Their bearing is more proper, their books are better kept, their language is more choice." These, no doubt, are desirable things, but they are essentially feminine characteristics. The other proposal is equally in accordance with French traditions, and equally antagonistic to Teutonic ideals. It is, that "dancing and deportment" should be reintroduced into all the secondary schools. The effect, no doubt, would be to maintain that "courtly foreign grace" which has made the Frenchman the most charming of companions. But it is very doubtful whether it would enable the nation to hold its own against its younger rivals, or arrest its threatening decadence.

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A charming story is told of the King of Sweden. He often spends the summer in the western watering-place of Marstrand, and takes pleasure in visiting the national school there. On one occasion the teacher was speaking about the great men of the Gustavian era. The king, pleased with the fresh and alert manner of the children, put the question: "Well, can you tell me who have been the greatest Swedish monarchs?" The answer came in chorus: "Gustavus Vasa, Gustavus Adolphus the Great, and Charles the Twelfth." "Very good," answered the king. "But stay; the little one there in the corner seems to know of another monarch," he added, turning towards a little girl to whom the teacher had just whispered a few words. "What other king do you reckon among the greatest monarchs?" "Oscar the Second," was the shy answer. "Indeed! And what are the great things this Oscar the Second has done?" asked the old king, smiling. That question exhausted the historical knowledge of the little girl. She blushed crimson, and stammered, "I—I don't know." The king, as he smilingly stroked the fair head of the little one, said: "Never mind, my little daughter; I don't know it either."

EARLY next month the first volumes of the British Anthologies series, edited by Professor Edward Arber, will be published by Mr. Henry Frowde. The whole series, which the editor claims to be the first adequate attempt ever made towards a historical national anthology, will contain about 2,500 entire poems and songs written by some three hundred poets. Each volume is distinguished by the name of the chief poet of the period dealt with, and the Shakespeare, Jonson, and Milton Anthologies will be issued first. The books have been printed in large type, on good paper, in a cover specially designed by Mr. A. A. Turbayne, and their price will bring them within the reach of all.

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STANDARD V.

Lesson XXIII.

BEVERAGES: COFFEE AND COCOA.

ALTHOUGH not so universally popular as tea, coffee is a favourite beverage with many English people, and in the countries of the East—Persia and Turkey, for instance—it may be considered the national drink. It is strange to think that, though coffee has been used in this country for over three hundred years, it should have gained comparatively so little favour. Coffee-drinking nations, like the French, say it is because we do not know how to make it; and if ever you go abroad and taste the delicious *café au lait* of France and Switzerland, you will think there is some truth in the statement. Coffee, as frequently given to us in England, is a thick, muddy, pale-complexioned liquid with very little flavour. On the Continent it is clear, strongly flavoured, and a deep brown in colour.

To make good coffee it is necessary to use nearly an ounce of coffee to a breakfast-cup of water, whereas the practice in England is to use an ounce to two pints of water. Moreover, the coffee should be freshly roasted and ground. And this brings us to the question of what coffee is. The fragrant, soft, brown, powdery substance with which you are familiar is ground down from coffee beans, which are the seeds or kernels of the cherry-like fruit of the coffee plant (*Caffea Arabica*). In the picture you see a sprig of the coffee tree, bearing leaves, flowers, and fruit. The leaves are of a bright glossy green; the flowers are white and pink, and similar to the star-like blossoms of the jessamine; the berries are not unlike our English cherries, with their dark fleshy part outside and the hard kernel within.

There are, however, two kernels in the coffee berries, and it is these which are used for the beverage. In the lower part of the picture you may see a berry cut across to show the two oval kernels, each wrapped in a "parchment" cover, closely pressed together in the middle, with their flat sides touching each other, and the rounded sides embedded in the pulp. When the berries are ripe, they are shaken from the tree into white cloths spread out upon the ground, and allowed to dry in the sun. In time the fruit shrivels up, much as a cherry will if you keep it long enough, until there is nothing left but a dry husk covering the beans within. At this point the fruit is put between rollers, and the hard husk is crushed and broken, leaving the beans exposed, and ready to be sent away to other lands.

If you examine a raw coffee bean, you will be surprised to find that it has little taste or smell. Roast it, and the change is surprising, for now we have the odour and flavour of the coffee of our breakfast table. You must remember in connection with coffee that it quickly loses the best of its flavour, so that, to get really good results, the beans should be freshly roasted, and only ground immediately before use. In some houses a small coffee-mill is kept, and the coffee ground as required. This ensures a good flavour; but, failing this, try to obtain your coffee from a tradesman who grinds every pound or half-pound as it is asked for. Remember, too, that coffee should either be drunk entirely without milk—the *café noir* of the Continent—or be mixed with milk in equal parts.

The *adulterations* of coffee are not nearly so numerous as those of tea. The chief one is the admixture of a substance called chicory, which is so like coffee as to be difficult to detect by mere inspection. Here is a test, however, which will enable you quickly to judge whether or not chicory is present, and if so, in what quantity. Put a tablespoonful of ground coffee into a glass of cold water. Pure coffee floats for a while on the surface, and does not colour the water; chicory, on the other hand, rapidly sinks to the bottom, imparting in its course a deep brown hue to the water. If pinched between the finger and thumb, chicory cakes, whereas coffee does not.

COFFEE PLANT.

Sometimes cheap starchy food is added to coffee; this can be detected by adding a drop or two of iodine to a little coffee, and examining it under the microscope. If starch is present it will be coloured blue.

To understand the effects of coffee-drinking, we must look into its *composition*. Like tea, it has an alkaloid called caffeine, which is very similar in nature to theine. It has also, unfortunately, an injurious acid identical with tannin, but taking the name of caffeic acid. A volatile oil is developed during roasting, which gives to coffee its peculiar fragrance; and there is also present in the coffee bean a certain amount of nitrogenous matter, fat, woody fibre, and mineral salts, which do not, however, appear in the infusion. Since its composition is so very much like that of tea, it is not surprising to find that coffee-drinking produces similar effects.

Owing to the stimulating power it exerts on the nervous system, and the exhilaration and wakefulness it produces, strong coffee forms not only a refreshing and reviving

Next Month:

EDUCATION IN MALTA.

Illustrated.

beverage, but a valuable antidote in cases of poisoning by narcotics such as opium, where the action of the poison causes sleep.

Coffee may assist the excretory action of the large intestine, and it somewhat increases the action of the heart. Unlike tea, which promotes the flow of perspiration, coffee produces a hot, dry skin; it is also apt to produce a disordered liver.

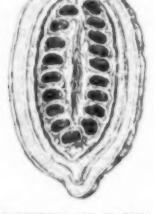
On the whole, however, coffee is not so injurious in its effects as tea, and might with advantage be substituted for that beverage oftener than it is.

Cocoa is a beverage which is scarcely less popular than tea and coffee. The soft brown powder which you all know so well gives no clue as to what it really is; neither does its name, for there is no connection between the beverage cocoa and the cocoa-nuts you see in a fruiterer's shop.

When Europeans first visited America, some four centuries ago, they found a tall tree called the cacao, bearing large oblong pods, from which the natives made a refreshing drink.

The illustration given below shows the appearance of the pod as it hangs on the tree. You must not think, however,

FRUIT OF CACAO TREE.



SECTION OF SAME, SHOWING SEEDS.

that the prepared cocoa you buy in packets is obtained by grinding these pods into powder. The outer covering of the pod is hard, tough, and woody, and altogether unfit for food; but if you cut a pod open, as shown in the accompanying figure, you will find that it contains an indefinite number of seeds embedded in a pinkish pulp. These are the cocoa beans, and it is from them that the various kinds of cocoa are manufactured.

The first process is rather a curious one; for before the beans can be roasted they must ferment, and this process is induced by burying the fresh nuts in the damp earth for a few days, and then exposing them to the sun. After this the beans are roasted, much in the same way as coffee beans. The next step is to crush the roasted beans into small pieces, and these pieces are known as cocoa-nibs. Some people prefer to use these nibs in preparing the beverage; but where this is done, the cocoa must be well boiled to make it digestible.

What is known as soluble cocoa is much more generally used, and is easier of digestion. Pure cocoa, as obtained from the pod, contains 50 per cent. of fat, known as cacao butter, in addition to 10 per cent. of starch, nearly 2 per cent. of theobromine—a substance which closely resembles caffeine—about 4 per cent. of salts, 8 per cent. of gum, and 20 per cent. of woody fibre.

The very large amount of fat makes pure cocoa far too rich for ordinary digestive powers, so, in preparing it for the market, from 20 to 30 per cent. of fat is removed, and its place filled by the addition of starch and sugar. The thickening of cocoa when mixed with boiling water is due to the starch present. Cocoa is rendered soluble by taking away the cellulose or woody fibre, which former lessons have taught you is quite insoluble.

The chocolate of which you are all so fond is prepared in the same way as soluble cocoa, with perhaps a little more starch and sugar, and is ground up into a smooth, fine paste, and then dried.

How does cocoa compare with tea and coffee as a beverage? A glance at its composition shows you that the presence of theobromine gives it stimulating properties. A second glance reveals that there is nothing of an acid nature—nothing which corresponds to caffeic acid—and this point alone gives cocoa a decided advantage over its two rivals. It is because of this that doctors so frequently recommend cocoa in place of tea and coffee. Look yet again at the composition of prepared cocoa, and you will find a large proportion of fat, starch, and sugar, all of which have considerable nutritive value. We may therefore consider that cocoa is not only a beverage, but a food; and this is a great point in its favour.

In its *effects on the system* it is perhaps not so refreshing and stimulating to the nerves as tea and coffee; but, on the other hand, it has no injurious action, and may be taken with safety along with meat or with any other article of diet. In promoting the action of the skin it is as useful as tea. Its one drawback lies in the fact that with some persons the fat it contains is apt to disagree.

A good cup of cocoa is easier to prepare than either tea or coffee. The one essential is that it must either be well boiled or thoroughly mixed with boiling water or milk, otherwise the starch grains will not burst, the flavour will not be brought out, and the cocoa will be thin and tasteless.

The best cocoa is made with boiling milk, though good cocoa can be made with boiling water and the addition of a liberal supply of milk.

SUMMARY.

Comparison of Tea, Coffee, and Cocoa.

(*a*) Each contains an alkaloid—theine in tea, caffeine in coffee, theobromine in cocoa.

(*b*) Tea and coffee contain a volatile oil; cocoa is rich in cacao butter.

(*c*) Tea and coffee are merely beverages; cocoa is a food as well as a beverage.

(*d*) Tea is prepared from the leaves, and coffee and cocoa from the berries, of their respective plants.

(*e*) Tea and coffee contain an injurious acid—tannin in tea, caffeic acid in coffee; cocoa contains much less acid.

(*f*) Tea is very stimulating, coffee is exhilarating, and cocoa is only mildly stimulating, in action.

(*g*) Tea and cocoa promote the action of the skin; coffee produces a dry, hot skin.

(*h*) Tea causes constipation; coffee has an aperient action.

(*i*) Tea and coffee are both liable to produce indigestion; cocoa very rarely has any injurious effect.

THE PRINCIPLES AND PRACTICE OF CLASS TEACHING.

GEOGRAPHY.—(*Continued.*)

Geographical Terms.

THE next series of lessons will deal with the **meaning of the common geographical terms**—hill, river, bay, and the like—**and their conventional symbols on a map.** At this stage the country teacher has an enormous advantage over his brethren in the city, and the teacher in a seaport town has a considerable advantage over those in many inland towns. Geographical terms represent ideas which cannot be correctly or intelligently formed without the objects referred to being actually seen. The class may be able to give definitions glibly enough, and yet not be in possession of the corresponding ideas. **Good pictures and models are the best substitute for the actual things,** and should be freely used.

Along with the picture and description of the thing should come the **conventional representation of it on the map,** so that each lesson should give the pupils an increased power of interpreting a physical map. Any suitable physical feature of the district should be freely referred to for illustration, however imperfectly it may represent the type of feature under consideration.

A large wooden tray and a few handfuls of sand will do much to help in these lessons. It may be used in such a way as to help materially in giving intelligent conceptions of such features as hills, mountain chains and peaks, bays,

capes, and islands. **Imaginary landscapes should be constructed in sand by the children,** and the practical handwork involved in so doing will fix interest and attention. Whenever such a landscape has been modelled, **the map of it should be drawn on the blackboard,** so that increasing familiarity with the meaning of a physical map may be given. **A model in clay** is easily constructed, and is also more permanent, so that it can be used for several successive lessons. If the district presents any marked physical features, the teacher will find it of great service to construct **a rough model of the district itself.** Many teachers use a model of this kind—a somewhat exaggerated relief map, which forms a useful transition step to the flat paper map. Small objects may be fixed in the clay to represent houses, trees, etc., on an exaggerated scale, and when dry the whole can be roughly coloured in tints somewhat approaching those of nature.

> Children take great interest in such models, especially when allowed to assist in their construction, and anything which excites interest is of the highest value in school work. Some teachers have caused a very lasting impression of a volcano, for example, by embedding in the sand model of a hill a small cone of damp gunpowder, and then setting fire to it. The eruption which resulted was, if not strictly in accordance with the laws of volcanic action, a great deal more valuable for teaching purposes than an hour's talk to a young class. Others have illustrated the phenomena of rivers and watersheds by pouring an artificial rainfall from a watering-pot over the prepared clay model. The rivers behaved in a more natural way than the volcano referred to, and the experiment was entirely on the right lines for mental training.

In teaching the meaning of geographical terms, it is of much importance to **show the relation of one set of features to another.** An island should be thought of as the top of a partially-submerged hill, a lake as a dammed-up river, and so on. The teacher can use a clay model and a small quantity of water to illustrate such facts in a practical way. And even with a young class some notion may thus be given of the action by which the **physical features have been formed,** such as the way in which rivers form valleys, or form islands at their mouths, and the way in which islands are affected by a gradual rising or sinking of the land in any district. For in teaching geographical definitions, as in teaching anything else, it is only by going a good deal wider than his actual subject that the teacher can give an intelligent view of that subject. Doing good work up to any prescribed limit always implies going beyond that limit. We must aim above our mark in order to hit it.

The way in which mountains and rivers are related may be shown experimentally on the clay model, as already mentioned. The same point may be impressed by the use of the blackboard. The teacher may draw the map of an imaginary or real island or district, and mark on it all the important watersheds and hills. The pupils may then be required to put in the rivers which would probably be found there in their correct positions as regards these watersheds and coast-line. Or the exercise may be reversed. The teacher may draw the rivers flowing in various directions, and require the class to show the position of the watersheds. When these exercises have been done, the probable positions of seaports, and of lines of railway connecting these with other towns marked in the valleys, may be put in by the pupils, having regard to the slopes roughly indicated by the map.

The Use of a Globe.

In teaching the topography of any country, the question of **scale should again be referred to.** The country should not only be shown detached, but in connection with other countries in a map of the continent, and also on a clearly-marked globe. The globe should be in frequent use in every class from the commencement of topographical teaching. In the more advanced classes this is obviously necessary, because many facts, such as ocean routes and the like, cannot be shown on a map with any degree of accuracy.

Next month we shall begin OUR HOLIDAY CONTRIBUTIONS by a series of CYCLING PAPERS FOR TEACHERS.

ELEMENTARY LESSONS IN THE PRINCIPLES OF GRAMMAR.

BY JOHN R. TIMSON, B.A.,
Head-Master, Board Schools, Royston, Barnsley.

LESSON VII.

GENDER AND NUMBER.

GENDER.

When we note the things around us, the first great distinction we see is—

1. Living creatures.
2. Things without life.

Living creatures consist of two classes:—

1. Males.
2. Females.

This distinction is called sex.

Though plants live and grow, and also have sex, they cannot move from place to place; therefore we include them in things without life.

We arrange names in classes, to match the classes of things.

Thus, of pronouns, or first-names for everything, we use "he" for one of the male sex, "she" for one of the female sex, and "it" for a thing without life.

Separate names or nouns are often used to indicate the sexes; for example,—

"Boy," the name of a male.
"Girl," the name of a female.

This distinction in words is called *gender*. We must not confuse gender with sex. Gender belongs to *words* only, sex to *living creatures*.

Living creatures are of the *male* or *female sex*.

Names of these are of the *masculine* or *feminine gender*.

It is a good practice to write out lists of the names of males and females; for example,—

1. *Relations:*—

Father,	mother.
Son,	daughter.
Brother,	sister.
Uncle,	aunt.

2. Persons named from their *station* or employment:—

King,	queen.
Prince,	princess.
Duke,	duchess.
Lord,	lady.
Mayor,	mayoress.
Master,	mistress.

Some names are used for either male or female:—

Parent, relation, child, cousin,
sovereign, ruler, servant.

Such words are said to be of the common gender. There is no common sex. *Common* means, "name of either the male or female sex."

Thus, for animals, in ordinary conversation we use one word for both sexes—cat, dog, horse, bird, fish. These names are then common gender. We do not use separate names to distinguish the male from the female in the lesser animals, reptiles, and insects. The driver calls the female horse a "mare," which word is of the feminine gender; but only those engaged in the rearing of dogs or in hunting will call a female dog a "bitch." We must carefully avoid being indelicate. But for the larger and more familiar animals we use separate names for male and female; for example,—

Lion,	lioness.
Tiger,	tigress.
Bull,	cow.

The pronouns "he" and "she" are often used to indicate sex; for example,—

He-goat, she-goat.

The word "it" is used even for a human being when we are ignorant of the sex. We may ask of a baby, "Is *it* a boy or a girl?" "It" is here of the common gender.

The names of plants and things without life are said to be of the *neuter gender*, which means that the things are neither male nor female—that is, of no sex at all.

There is no neuter sex.

Remember, the two sexes—male and female—are in *living beings* themselves; the four genders—masculine, feminine, common, and neuter—refer to *words*, not to *things*.

NUMBER.

The name of one single thing is said to be of the singular number; for example,—

I, thou, he, boy, man, ox.

A name used for more than one is said to be of the plural number; for example,—

We, they, men, oxen, dogs.

Plural means "more than one."

The plus sign + means "more" or "and."

1 + 2 = 1 *and* 2 *more.*

Personal pronouns have separate words for singular and plural; for example,—

Singular—I, thou, he, she, it.

Plural—We, you, they.

The plural of nouns is shown in three different ways:—

1. By adding *s* or *es* to the singular: boy, boys; box, boxes.
2. By adding *en*, as, ox, oxen.
3. By a change of the vowel, as, man, men.

MEMORY NOTES.

Living creatures are of the male sex or of the female sex.

Names of the male sex are of the masculine gender. Names of the female sex are of the feminine gender. Names used for either sex are of the common gender. Names of things without sex are of the neuter gender.

Names meaning *one only* are of the singular number. Names meaning *more than one* are of the plural number.

THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

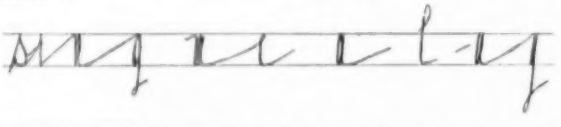
Good and Bad Methods. In dealing with the varied subjects of the school curriculum, I do not propose to treat them in detail as one would when lecturing to pupil teachers upon school method, but rather to touch upon obvious defects on the one hand, or excellent methods on the other hand, as they have come under my notice. Consequently I should be glad to hear from any of the readers of this magazine who would like any particular point dealt with.

* * * * * *

Handwriting: Style. Handwriting is the subject for this month. This subject is frequently learned by the scholars. Teachers do not so generally teach it as they do arithmetic, say. Handwriting is good only in those schools where the subject is dealt with as the other subjects. There are a few general points to be first considered. Let us take first the style of writing. With this an inspector has not much to do. It matters little what the style is so long as the handwriting of the scholars is good. I have found the best writing myself done in schools where the old, round, slightly-sloping hand is taught. In discussing styles, however, I think we may at once condemn two at least—the vertical and the angular. I can best summarise the objections to these by quoting the words of inspectors from a recent Bluebook:—

"The vertical writing, which invariably resulted in backward writing as soon as any speed was attempted, is disappearing, and so is the abominable angular style, with its narrow letters and its elongated spaces."

"In several schools the children were taught to crowd together the parts of each letter, to lengthen the connecting strokes, and to get rid of curves as much as possible. The excuse given for adopting this style is that it is easily taught. This is surely an error, as continual care is necessary to prevent it from degenerating into a parody of writing. I found one school where the letters looked little better than wriggles joining the connecting strokes."



Teachers not infrequently ask my opinion upon the style of the handwriting taught. My reply to them is: "If the handwriting be good, it matters not what the style may be."

Note the telescoped letters, which are often illegible. In this style many of the shapes are open to objection—letter "e," for instance. Writing on this phase of the subject, one of the Chief Inspectors says:—

"To decide—in England—between vertical and sloped writing, and, if need be, between slope and slope, may possibly require further experiment. And the oculist may have his word to say. Two things may, however, be stated with confidence:—

"1. The reader must be considered. He must not be invited to accept connecting strokes instead of letters—that is, to accept a writing in which the letters are vertical but nowhere, and the connecting strokes are conspicuous and everywhere. *Writing must be legible.*

"2. *There must be reasonable speed.* Children are slow, but even for a child a pen may be too slow. It might perhaps be argued with some justice that, rather than write with extreme slowness, it is better not to write at all."

* * * * * *

The same Style for Infants and Elder Scholars. In too many schools one finds a want of co-operation between the head-teachers of the various departments. Before now I have found in the infants' department one style, in the juniors' another, and in the seniors' a third style. The result of all this is that the writing is slovenly, and barely satisfactory, in the upper standards, which is not to be wondered at. The managers of a school should see that the method is continuous throughout. This might and should be easily obtained by a friendly conference of the heads.

* * * * * *

Provide Good Materials. Provide the children with long slate pencils. Often we find stumpy bits in use. How can good writing be expected without proper material? The short bits can be used up by having holders. Slate-writing should be discarded as early as possible. Slates should never be used for handwriting in the upper standards. In the lower standards try blacklead pencils and paper; slates are dirty. In some schools where the writing is good, slates are not used at all. Provide fairly good paper for writing upon, and do not let broken slates be used.

* * * * * *

Copy-books. We will now deal with copy-books. In the first place, it must be understood that separate books for copy-writing are required by the Code in every standard. In many schools I have found the copy-writing done in the ordinary exercise book. Copy-books must be kept. Now as to the kind. Personally I favour the blackboard copy-writing as preferable to copy-books with headlines. This gives more opportunity for thorough blackboard teaching. The copy is set on the board, and is suitably chosen by the teacher. The child has seen it written, and regards it as more easy to copy than the printed headlines.

There is a danger of setting the children to write on and on without supervision when there are headlines; one is tempted to use the copy-book lesson for marking exercises or arranging for other lessons. There should be two copy-book lessons a week, and each exercise should be dated, and the mistakes marked and pointed out on the blackboard. In the lower standards each word almost should be supervised as it is written. Only a few lines need be done in one lesson. In the upper standards there is less objection, if any, to good copy-books with headlines. Indeed, there are some I have seen for Standards V., VI., and VII. which have all kinds of useful copies—for example, a short letter, an addressed label, a cheque, a tradesman's bill, a telegram, etc.

* * * * * *

ANSWERS TO CORRESPONDENTS.

B.—Your certificates are insufficient as they stand. To be eligible for your second class "D," you must obtain at least a second class in the new perspective examination.

W. B. G.—According to your measurements you have accommodation for seventy-five. I am reckoning on the ten square feet basis. Some of the older schools are calculated upon the eight square feet basis. Look up your school in the Bluebook. You will there find what number is recognised officially. I don't advise you to refuse admission upon your own responsibility. Consult your H.M.I., and leave the overcrowding to be dealt with by him.

J.F.B.—There is no need to copy the names from your old admission register, but you should keep both at hand. In Form IX. you simply state what drawing certificates you hold. Musical drill may be considered physical exercises. I am always glad to help any who, like you, are so far away from great centres.

A.T.H.—It is certainly usual for managers to hand a copy of the indentures to a pupil teacher at the time of apprenticeship. Your managers do not seem to have given you one. You can claim either an executed duplicate (which requires a second stamp) or a certified copy. The actual indentures are to be filed with the school papers.

M.B.—Certainly you may sit again next December. If you fail, your present success will hold good.

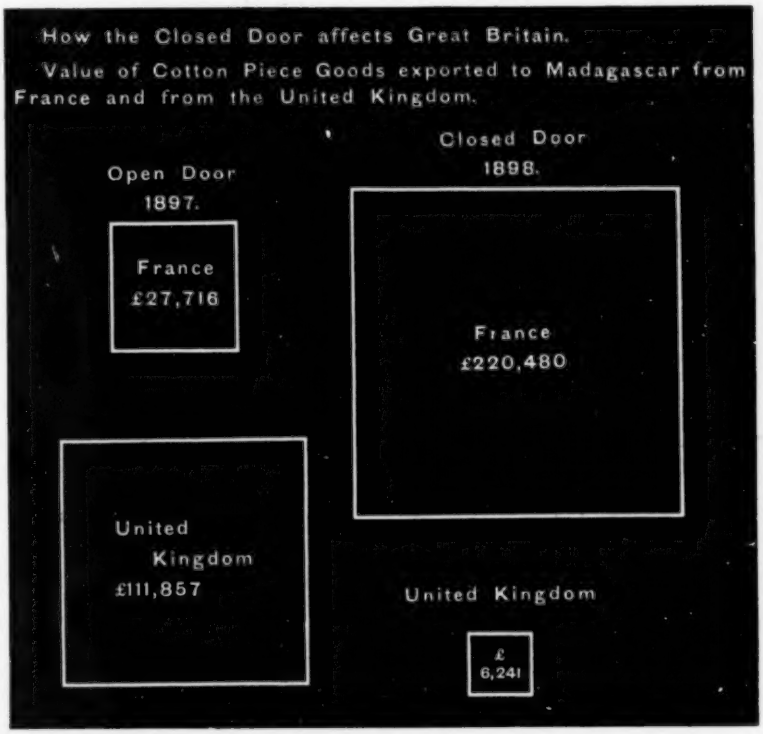
J.M.—The proper thing to do is to get the managers to extend your teacher's engagement for another year, and notify the Education Department to this effect. Until that is done he has no *locus standi* whatever. If you do not care to do this, he can of course teach, but would not count on the staff. You need not ask permission for him to sit again.

D.M.—You are not advised to open on Saturday before consulting your inspector or the Department. If you cannot make your 400 without, write at once to either, preferably the inspector. I can see nothing legally against the proceeding.

P.H.—You can sit for Queen's Scholarship Examination in December next. At present you cannot count on the staff. Should you pass the Oxford Senior Local, you could be engaged under Article 51 as an assistant teacher. There would be no need to sit for the former if you pass in July.

C.A.B.—You should have enclosed a stamp if you desired a reply by post. The new requirements state:—"All candidates must take group A (English), group C (Mathematics), and one other group, but no more. No credit is given for any subject in addition to those in the groups selected." You may take the science group E (two subjects of science), or group B (Geography and History). If you take two sciences, you must consult carefully the science regulations, one of which is that you cannot take the advanced stage of any science unless you have passed in the elementary stage of that science. Another requirement is that Physiography must be taken if you have not already passed in the elementary stage of that science. If you do not take the science group, the science taken at the previous May examination does not count extra. Briefly put, it comes to this: you cannot offer both group B and group E.

Letters should be addressed—"Inspector," care of The Editor, 33 Paternoster Row, London. And if a reply by post is required, a stamped addressed envelope should be sent. If urgent, an extra stamp should be enclosed.



OUR NEWSPAPER NOTEBOOK.

THE OPEN DOOR.

OUR readers will be familiar with the expression "open door," the closing of which, it is stated, is absolutely inimical to British trading interests. Recent events in Madagascar, where France has closed the door to cotton piece goods of British manufacture, provide a more than usually apt illustration of what a door closed to Britain really means. In 1897 France imported into Madagascar cotton piece goods to the value of £27,716, as against British imports of the same class of goods to the value of £111,857. In 1898 France closed the door, with the result that the French cotton piece imports increased to £220,480, and the *British imports decreased to £6,241.*

SOUTHWARDS HO!

The restless energy of modern explorers has left no part of the earth's surface *terra incognita*, with the exception of the sea and land areas around each of the poles. Hitherto the North Pole has held pride of place in the popular imagination, and many attempts have been made to bare the icy secrets of the Frozen North. Nansen has been within 150 miles of the coveted spot, and has returned to tell his story to a wondering world; since when Andrée, an intrepid balloonist, has probably crossed that Arctic bourne from which so many explorers have never returned.

For some time the Royal Geographical and the Royal Societies have been striving to rouse public interest in the exploration of the South Pole—the unknown land which a distinguished traveller says "is locked from our approach by impenetrable ice barriers and seas perpetually tortured by hurricane blasts"—about which little has been added to our knowledge since Sir James Ross ventured into the Far South, sixty years ago.

Thanks to the generosity of Mr. Llewellyn W. Longstaff, a Fellow of the Royal Geographical Society, who has given £25,000 to the exploration fund, the project is now placed beyond the region of speculation. At the time of writing the fund amounts to £40,000, and it is hoped that notwithstanding previous refusals, the Government may yet be induced to render financial aid in addition to the grant of the surveying instruments already promised.

As the main object of the expedition is to study the magnetism in the region of the South Pole, the vessel fitted out must necessarily be a wooden one, as an iron vessel would militate against the correctness of the magnetic observations. Probably the ship will be of the Norwegian whaler type, and may possibly be ready to sail in July 1900. The expedition will consist of at least nine persons, three or four of whom will be scientific men. A German expedition interested in the same objects will sail next year, and will explore one side of the Antarctic, and the British the other. In the meantime we must remember that a ship fitted out by Sir George Newnes is already carrying the British flag into the high latitudes of the southern hemisphere.

Remembering that the *Erebus* and the *Terror* coasted for 450 miles along an impenetrable wall of ice, 180 feet above the sea-level, and probably 1,000 feet in thickness, which

thus barred all further progress, we must not expect too much from the forthcoming expedition. It may, however, be confidently expected to at least contribute to the advancement of science, and also assist in the solution of more than one problem of navigation in connection with the origin of winds and currents.

SIAM.

Siam is a little-known country that is making an interesting attempt to raise itself out of Oriental bondage. Japan has to a great extent already worked out its own destiny, and is a constant object lesson to all Asiatics; and Siam promises well to profit by the example.

The King of Siam is still young, and is in many marked respects a genuine reformer, anxious to reorganise the administration of his country, to improve the condition of his people, and to generally raise Siam to a higher position in the scale of nations. In 1897 his Majesty spent a quarter of a million in a visit to Europe, and already it promises to prove an investment which will have far-reaching effects in his dominions.

Siam possesses almost every natural advantage that makes for prosperity: the people are of a particularly amiable disposition; all nationalities are welcomed; and there is an utter absence of that hatred of the foreigner which has so long hampered progress, and almost resulted in the complete disintegration of China.

A special correspondent of *The Times* relates how, under European advisers, the financial administration has been satisfactorily reformed, taxation adjusted and collected, and a capable police force organised. The Indian Government placed the services of one of their most experienced police officers in Burma at the disposal of the Siamese Government for two years. When he arrived at Bangkok, he found "the city was policed with an ill-disciplined, disorganised rabble who were the derision of every foreigner. Officers were insufficiently paid, and the pay was always in arrear. A large number of the men were slaves indebted to their officers or to the Minister, and never received more than one-third of their pay. No leave was allowed, and food and clothing were insufficient. The men were, in fact, as untrustworthy a body as could well be found anywhere. The nearer the police station the more insecure were life and property." The police force now consists of 2,515 satisfied men, among whom are Pathan recruits from the Afghan frontier and a few Sikhs. Crime against property and the person has decreased, and smuggling and illicit dealing have already received considerable checks.

Though much good work has been accomplished, real progress cannot be made until the inland communications are improved. There are no roads or bridges, and no railways except the line to Korat. Owing to a bar at the mouth of the Menam, steamers have to unload into lighters thirty miles from Bangkok. In the capital some few sanitary measures have been effected, but even now its 400,000 inhabitants have no water supply beyond the waters of the Menam, and thousands of lives are sacrificed annually to its polluted waters.

Siam is pre-eminently a rice country. Rice is the chief food of the people, it is the chief export, and it is with rice that Siam purchases British goods. The export is at present confined almost entirely to the lower plains, but a railway to Chiengmai would open up thousands of square miles which would be thrown under cultivation.

Altogether the awakening of Siam presents many interesting features to Western nations, and its progress will be watched and welcomed, and, it is to be hoped, assisted also to the extent its own endeavours deserve.

THE GREAT SIBERIAN RAILWAY.

In our January number we stated that the Great Siberian Railway would probably be completed in 1904, but such unforeseen difficulties and obstructions have arisen that the date of completion has become extremely problematical. On the Manchurian section Chinese robber bands tear up the rails to forge into pikes for offensive purposes. It is believed that these marauders are in league with the contractors, who for a consideration are allowed to complete their contracts with the Government. The work is then undone, and further contracts are necessary. The troops to protect the permanent way are being strengthened very considerably, and immense orders for rails for immediate delivery have been placed in America.

SIR HENRY OAKELEY ON THE SCHOOL JOURNEY.

COMMENTING on the Westminster Training College in the recently-published Training College Report for 1898, Sir Henry Oakeley remarks:—"The study of geography at this college has for twenty years been supplemented by a 'school journey' from Croydon to Godstone, under the guidance of the master of method. Before it maps and plans of the district are drawn, and the general arrangement of the geological formations is studied—namely, the flat clay district of Norwood, the undulating chalk areas beyond Croydon, and the picturesque district of Caterham, due to the presence of sands and gravels in the midst of and upon the chalk. *The value of thus connecting facts of geography with their causes, and exercising judgment and reason in place of a mere remembrance of names, is obvious. This is the best way to teach geography*, and I am glad to learn that some teachers who have been at Westminster have taken groups of their scholars in a similar manner."

Our readers will remember that Mr. J. H. Cowham, the highly-esteemed Lecturer on Education at Westminster College, has already contributed several valuable articles to these columns detailing the method of conducting such school journeys. It may be of advantage to remind our readers that these articles are to be found in the June, September, and December numbers of last year.

FACILITIES FOR INCREASING PENSIONS.

Now that the Government scheme of pensions for teachers under the Teachers' Superannuation Act of 1898 has come into force, many teachers will undoubtedly cast about for means of securing some addition to the comparatively meagre allowances to which the new legislation will permit them to look forward. The annuities purchased by the annual contributions of £3 and £2 being reckoned at the low rate of interest which prevails in the soundest of Government securities, will of necessity bring but a small return, and those who can spare more from their current income will naturally seek channels of investment promising greater advantages.

Among the competing schemes which are just now appealing to would-be purchasers of supplementary annuities, one which seems particularly worthy of attention is that of the New York Life Insurance Company. From details we have received, this scheme of "family pensions" seems to offer remarkable advantages, including the passing on of the pension to a second person in case the original assurant dies before reaching the age to receive the pension, and even to others until it has been paid for twenty years. There is also provision for sharing in the accumulated profits, and for avoiding loss in case premiums should cease to be paid.

The report of this company which appeared in our columns last month shows its transactions to be on an enormous scale, and its soundness to be well safeguarded.

The superintendent for the Home Counties District is Mr. Chas. D. Crisp, until recently head-master of the Higher-Grade School, Ryde, and a well-known member of the N.U.T. Executive. Mr. Crisp informs us that he will be pleased to make arrangements to meet teachers interested in the subject, on Saturday mornings, at his office, 71-72 Piccadilly.

A HANDSOME VOLUME FOR PRESENTATION.

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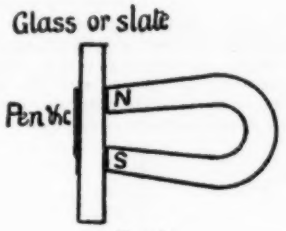
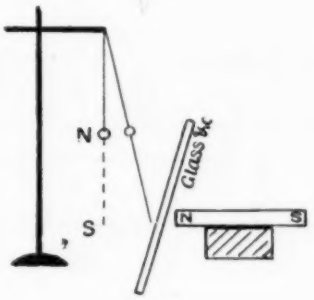
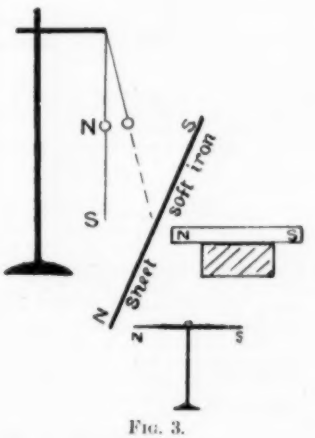
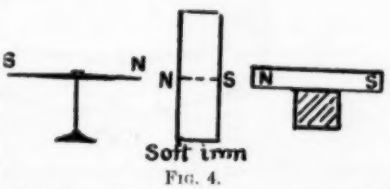
HOW TO TEACH MAGNETISM AND ELECTRICITY AS A "SPECIFIC SUBJECT."

By B. ELDERKIN, *Model School, Westminster Training College.*

FIRST YEAR'S COURSE.—MAGNETISM—Lesson 10.—Magnetic Transparency.

Apparatus.—Magnets, sheet of glass, an exercise book, a slate, a sheet of thin wood, a pen, sewing-needle, a stand for supporting a needle with cotton, a thin sheet of soft iron, a small piece of plate-iron about a quarter of an inch in thickness.

Heads and Matter Taught.	Method of Teaching.	Diagrams as Illustrations.
I. *The Horse-shoe Magnet.* 1. A magnet can influence a piece of steel or iron through all non-magnetic substances—for example, a sheet of glass, an exercise book, a sheet of wood, a penny, half-crown, etc. 2. The flux or influence of the magnet must pass through the intervening substance.	1. (*a*) Place a steel pen-nib or small sewing-needle on sheet of glass. (*b*) Put horse-shoe magnet underneath the glass and turn it about. The nib will *follow* the motions of the magnet. The glass may be held vertically or inverted. Still the pen will not fall away. (*c*) Repeat experiment with the other substances as may be thought desirable (Fig. 1). 2. Inference by questions.	 FIG. 1.
II. *The Bar Magnet.* A bar magnet will draw small magnetic substances towards itself through a non-magnetic substance. It could not do so unless the flux or influence could pass through those bodies.	Lay bar magnet on stand; suspend a sewing-needle by cotton so that the point of needle is in a horizontal plane with the pole of the magnet. The needle may be magnetised beforehand to ensure better result. The needle and magnet must be near enough to draw the needle out of the perpendicular, but not so as to touch the magnet. Now pass any number of non-magnetic bodies between needle and magnet, as shown. The needle will not fall back to the perpendicular (Fig. 2).	 FIG. 2.
III. (*a*) The influence of the magnet cannot pass a magnetic substance—say, a sheet of thin soft iron. (*b*) Explanation of this phenomenon—the sheet-iron has become a magnet. Its poles are on the edges of the sheet of iron.	(*a*) Repeat the last experiment, but substitute a *thin* sheet of soft iron (cut from biscuit or mustard tin). The needle at once falls back to the perpendicular (Fig. 3). (*b*) Allow scholars to note this result. The reason may be discovered by the following experiment:—Bring the magnetic needle near the edge of sheet, and move it along until a point is found in the sheet which repels a pole of the magnetic needle (Fig. 3). That point is one pole of the sheet-iron. The other pole is at a point on the opposite edge: mark these points on diagram. The reason for the falling away of the needle is apparent (Fig. 3).	 FIG. 3.
IV. *Difference of result if thick soft iron is substituted for the thin sheet.* The iron has become magnetised, but its poles are no longer at the edges but in centre. The poles of the soft iron attract the needle once more.	Remove the thin sheet-iron and substitute a thick piece of soft iron—say, a quarter of an inch thick. The needle is once more attracted. To show *why*, bring a pole of the magnetic needle near the *centre* of the thick iron. The magnetic needle will be attracted or repelled, as the case may be. This fixes the polarity of *one side*. The opposite point will give the other pole (Fig. 4).	
V. *Truths learned.* A non-magnetic substance is said to be *transparent* to magnetism because it will allow magnetism to pass through it. Magnetic substances are not transparent: they become magnets.	The use of the term "transparency" is suggested by the analogy of light and transparent and non-transparent substances. It may be explained that no point in the study of magnetism has been more fully investigated than this, on account of its bearing on the construction of *motors*, to be referred to later.	 FIG. 4.

NEEDLEWORK FOR PRACTICAL TEACHERS.

By the Author of Blackie's "Manual of Needlework."

WHILE THESE NOTES ARE WRITTEN SPECIALLY TO MEET THE REQUIREMENTS OF CERTIFICATE CANDIDATES, THEY WILL BE FOUND USEFUL BY ALL TEACHERS WHO HAVE TO PREPARE FOR EXAMINATION IN THIS SUBJECT.

NECK CURVES AND NECKBANDS OF CHEMISE.

THE most difficult part in the construction of a chemise is the arrangement and setting-in of the neckbands.

Neckbands may be *closed* or *open*.

CLOSED NECKBANDS.

(*a*) *Length.* Half the width of the chemise at the foot-hem is generally allowed, but it may be longer or shorter.

(*b*) *Depth.* From ⅜ of an inch to 1 inch when finished.

(*c*) *Neck curves.* These must be cut very carefully. The back and front should be cut, *even to a thread*, with a *deep* curve towards the shoulder, as in Fig. 1.

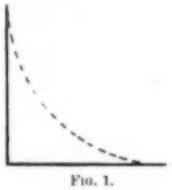


FIG. 1.

The depth of the curve in *the front* of the chemise should be about one-eighth of the length of the chemise; while that on the back is from ½ inch to 1 inch less than the one in the front.

(*d*) *Folding of the neckband.* Fold down ¼ inch along the weft edges of the band. (Fig. 2.) Place the right hand fold

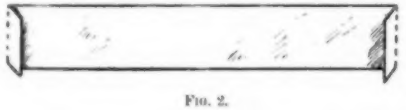


FIG. 2.

immediately above the left hand one, and seam as in Fig. 3; or place the weft edges together without folding, and stitch or run and stitch ¼ inch from the edge.

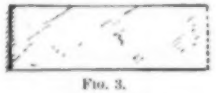


FIG. 3.

Flatten this seam out carefully as in Fig. 4, and then fold ¼ inch down along both the edges of the band.

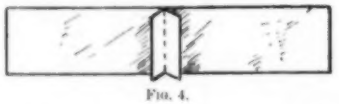


FIG. 4.

(*e*) *Division of neckband.* The seam will mark the point to be affixed to the *centre of the back.* Fold in two to find the *centre of the front;* the centres between will mark the shoulder points. In *closed* bands all the quarters *may* be of the same length, but even in these it is advisable to move the pins a little back towards the seam (see Fig. 5), so as to give from ½ inch to 1 inch more for the deeper curve on the front, to permit more room for the chest, and to allow the short quarters to set more closely to

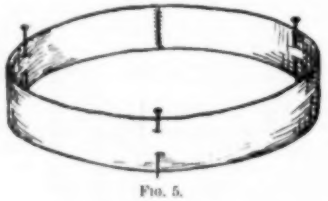


FIG. 5.

the back. When an *open* band is used, the back quarters *must* be shorter than the front ones. (Fig. 6.) Instead of moving the pins *backwards*, the quarters for the shoulder points might be pinned from ¼ inch to ½ inch towards the front of the chemise neck.

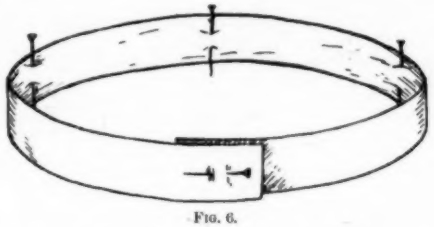


FIG. 6.

(*f*) *Gathering of the neck.* No part of the curves towards the shoulders should be gathered. The straight parts on the back and front should be halved and quartered before the gathering is commenced. The gathering thread should run about ¼ inch from the top edge of the chemise, as in Fig. 7. If a

FIG. 7.

front fold is put into the chemise, the gathering for the front should be begun and ended ¼ inch from the folds, as in Fig. 8.

FIG. 8.

(*g*) *Setting in of chemise to neckband.* Having stroked the gathers carefully, pin the four centres of the band to their respective places on the chemise. If open in front, the short edges of the neckband must be placed on a line with the edges of the front folds. Fit the neck curves into the bands, being careful to slightly *ease in* the curved part while the band is held *tightly.* Then set in the gathers and fell the wrong side neatly.

(*h*) *Button and buttonhole.* The buttonhole should be exactly in the *centre* of the band, ¼ inch from the edge of the right hand side of the band (women's garments button right over left), and should be about $\frac{1}{16}$ inch larger than the diameter of the button. It is usually made with a rounded and a braced end, the rounded end being nearer the band end. Attach the button directly opposite by a stitched circle or star. The ornamentation will be taken up afterwards.

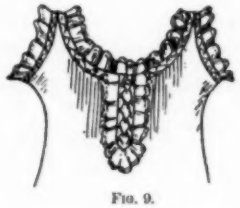


FIG. 9.

SCHOLARSHIP FRENCH FOR 1899. LE TRÉSOR.

BY FRANÇOIS COPPÉE.

LITERAL TRANSLATION FROM THE ORIGINAL TEXT, WITH NOTES.

(Authorised by Proprietors of the Copyright.)

THE ABBÉ.

However, my nineteen manuscripts
Are there, which some day will astonish Paris;
And you will not be any-longer poor as you *[1] are:
I make you heirs of my complete works.

JEAN, *serving (or "helping") the Abbé.*

Good...But in (=while) awaiting this far-off result,
Let-us-eat in (*i.e.* out of) *earthenware and drink out of * pewter,[2]
Since contentment, one says (=it is said), ("sur"-)passes wealth.

THE ABBÉ, *aside.*

Ah, the little suppers formerly at the[3] duchess's!

VÉRONIQUE.

Is it true, Monsieur Jean, that you might (=may) still
Be very rich one day?

JEAN.

And how?

VÉRONIQUE.

That treasure?
Those diamonds hidden under (*or* during) the ("reign of") Terror.[4]

JEAN, *shrugging his shoulders.*

(A) chimera (=mere fancy!)

THE ABBÉ.

I have seen them (=I saw them) formerly worn[5] (*lit.* carried) by your mother;
They were-worth, I answer for it (=you may take my word for it), more than a hundred thousand crowns.

JEAN.

Then they have been taken, be assured of it.
These diamonds, moreover (*lit.* of-the rest), have quite a history (*lit.* legend)
In the family; they are of (a) very great value,
And their brilliancy made dream formerly
More than[6] one worthy lady at the court of the Valois.
Upon (*i.e.* about) these jewels of-which I have lost the trace,
At his coming-of-age each eldest ("son") of my race
Always from-the duke his father had, one says (=it is said), received
An important secret which I have never known.
In-short, they would be ("it seems" understood) hidden here... Quite a history!
I believe in-it little; but I believe firmly in the black band,[7]
I believe that for * nests there are[8] bird-catchers,
And for the diamonds that one hides, thieves.

THE ABBÉ.

This treasure,—if, however, one day one discovers it (=it is discovered)?

JEAN.

Ah, well, then! I will make rebuild my Louvre.[9]
My low-pitched hall, open at this hour (*i.e.* now) to every wind,
Shall be closed and warm, as formerly.
As formerly, the old fire-place
Shall be by a flaming and bright fire lit-up;
And by (=in) the evenings of winter I shall be able to dream alone
Of the virtues of formerly, before (*i.e.* in the presence of) my great ancestor.

VÉRONIQUE.

And, very (=*bien*, well=*très*) sincerely, this lack of fortune[10]
Does not ever cause you of (=any) importunate (=worrying) thoughts?

JEAN.

No, for I resign myself (=am resigned), and that is the art of being[11] happy...
It was very different when I was in-love.

VÉRONIQUE, *aside.*

Ah! It is (*lit.* see-there) so long that he had not spoken of her (=he had not spoken of her for so long).

JEAN, *with a little * bitterness.*

Irène des Aubiers, the haughty young lady...
What becomes-she (=what is becoming of her—*i.e.*, what has become of her) then?

THE ABBÉ.

(But=well) still,[12] sometimes
I meet her going at-the gallop through the woods.
She has the air on horse(-back) of a Scythian Amazon (*a l'air de*=looks like).

JEAN, *rising.*[13]

Yes; the old memory by moments (=from time to time) revives...
She can * boast at having made me[14] suffer,
Go![15] was mad("ly in love") with her, and I have thought to die
When her parents (*or* relatives), notwithstanding the name by-which I am called,[16]
Have refused the hand of the poor nobleman.
And when it has been necessary for-me, quite alone, like an owl,
With this great trouble to shut myself in my hole,
Irène, Irène, alas! cruel daughter of Eve!
She had, nevertheless, let me cherish (*lit.* nourish) this dream,
That under this crumbling roof might flourish, one day,
A lily that would fill it with (*de*, not *avec*) its perfume of love!
She had given me the divine hope
That (the) happiness would-come ("to"="and") inhabit the ruin!
And I have often wept when, in this old granite ("building"),
I saw in the spring-time the bird make its nest!...
I have ought("ed") to resign myself (=I ought to have felt resigned)...but the blow was very rough...
Then you are (*lit.* have) come (=then you came) to people my solitude;
My sadness healed, and the time flowed *[17] ("away").

Putting his hand on his heart.

And I do not suffer more (=any longer) when I place my hand there!

VÉRONIQUE, *aside.*

If he said true!

JEAN.

Enough about this reverie,
For I am failing in the duties of * gallantry.

To Véronique, who removes the table-cloth, etc.[18]

And I wish to remove the "table-cloth"[18] with you.

VÉRONIQUE.

"Many thanks," Monsieur Jean.

THE ABBÉ, *aside, while (that) Jean helps Véronique to clear* ("the table") (lit. *un-serve*).

In what time("s") do we live?
A La Roche-Morgan not to be able, at his ease,

---

* Articles, prepositions, etc., that are untranslatable are marked by an *.

1 Note this *le*, "it," which refers to "poor." *Etes-vous malade?* "Are you ill?" *Je le suis*, "I am 'it' or 'so.'"

2 *Etain* is tin rather than pewter. The drinking vessels are of "metal," not of silver.

3 This preposition—formerly a noun—means, literally, "at the house of." Lat. *casa*, "a hut, a cottage." Compare *une case*, "a negro's cabin, a hut."

4 The terrible Reign of Terror lasted from the 31st of May 1793 to the 27th of July 1794.

5 "To wear" in the sense of "to wear by friction," etc., is *user*.

6 Note the *de*, "of." In *plus que*, the *plus* is comparative. *Il a plus d'argent que vous*, "he has more money than you."

7 This term *bande noire* is applied to speculators who buy up estates and old buildings, selling again the former in allotments, and the latter as old material.

8 Here, *il est* (*lit.* it is)=*il y a*.

9 Formerly the royal residence in Paris; now a museum.

10 The French word *fortune* is not exactly synonymous with the English "fortune;" it is often equivalent to "wealth, property."

11 *Lit.* "to be." Note the infinitive after *de*.

12 *Encore* loses its final *e* in verse when the metre renders the suppression of the syllable necessary.

13 *Lit.* "raising himself." Note again the force of the reflective verb.

14 Note again the infinitive.

15 *Lit.* "Go!"="I can tell you!"

16 *Lit.* "I name myself."

17 Words simply placed between brackets do not admit of translation; when placed between brackets and marked by commas, thus (" "), they do not exist in the French text, but serve to express in English the sense of the phrase of which they form a part.

18 *Couvert* is what "covers" the table prepared for a meal, and is commonly used where we say "knife and fork."

To marry whom ("it") pleases him...Come! (= Look you!)
("17")93
Triumphs. (The) good taste *[1] is dying ("out"), and everything
with ("it").
Monsieur Talma[2] dresses * in true Greek costume...
(The) poor old France has perished (quite) entire("ly").
No-one[3] knows any-longer ("how") to-hold his snuff-box,
To take his pinch ("of snuff" thus)—the gesture was charming—
Then with a fillip[4] at the frill ("of the shirt-front") briskly
To remove the snuff (as-far-as) to the tiniest atom.
That has the appearance of nothing[5] (= that looks a mere
nothing)...It is a grave symptom—
Of our decadence it is the precursor;
And (the) one will say of me: "That is the last snuff-taker!"

*One hears (= there is heard) outside the noise of a cart which * stops on the flagstones of the court.*

A VOICE (*at the*) *outside.*

Monsieur Jean...Monsieur Jean!...Hi! Stop, Grizzle (*lit.* = Grey, *fem.*).

JEAN, *striking* (*i.e.* tapping) *on the shoulder of the Abbé.*

Searchers of millions! see-here ("that") which sobers us...
(= here is something to cool us down).
It is my valet Martin who returns from (the) market.
(Now) Then while (*lit.* in) awaiting the dislodged (*lit.* un-niched, un-nested) treasure,
The lord of within (= here, this place, an old word), widow (*i.e.* deprived) of all patrimony,
Goes to know (= has to ascertain) if at least he sells' well his oats (*singular in the French*).

THE VOICE.

Monsieur Jean!

JEAN.

One goes there[6] (= I am coming).

He goes out by (= at) the end (of the room).

SCENE III.

THE ABBÉ, VÉRONIQUE.

Véronique, who has finished clearing-the-table[7] (*infinitive*), *prepares* (i.e. *arranges*) * *flowers in a vase which she places on the table. The Abbé takes-up-again his quarto ("volume"), and * walks up and down* (lit. *of long = length, into broad = breadth*).

THE ABBÉ.

Let-us-resume our soaring (= flight).
I hold my tragedy, and am sure of my plan. •
Melpomene[8] has, without doubt, made a compact with me...
Let-us-see!...Scene of love, at first, at the second[9] act.—
One agrees readily that with me the lovers
Express in fine verses their tender feelings,
And paint as it befits the torment that devours (*lit.* gnaws) them...
—A dream, at * act three...I excel in * dream("s")...
And then, at * act four, a narrative. My narratives
In-the eyes of (-the) people of taste pass for successes (*lit.* succeeded, *past participle*).
I have indeed (by) here ("and") (by) there * scenes more trifling (*lit.* tiny)...
But I know ("how") to get through (*or* over) them (*lit.* to draw myself from *or* out-of them) by some sublime verses.

VÉRONIQUE, *dreamily* (lit. *dreamer*, fem.), *coming to the Abbé.*

(My) Uncle!

THE ABBÉ, *with impatience* (= *impatiently*), *aside.*

Good! again! (= Come! come!) No, never[10] I have been able
To work a moment without being (*infinitive*) interrupted.
What is-it that this child can wish ("of") me, in sum = (in short)?

VÉRONIQUE.

My father, is it not ("so"), was a good (*i.e.* real) gentleman?[11]

THE ABBÉ.

Without doubt...Often enough I have told you so (*lit.* it), I believe,[12]
My brave brother is (= has) died in-the service of the king,
Although he has never[13] had but the (= his) cloak and * sword...
But * "now" my rapture ("is"[14]) dissipated...
And you interrupt me, Véronique, at the moment
Where (= when) I was-putting the (= my) hand upon a good dénoûment.[15]

VÉRONIQUE.

Pardon me.

THE ABBÉ.

It is good. But I * go away,[16] my niece,
And I mount up (*lit.* there-high = overhead) to think of my piece...
Let us see!...A dénoûment...which is not (*lit.* may not be) commonplace...
Whom could I imitate so as to be original?

He goes out by the staircase to (the) right.

SCENE IV.

VÉRONIQUE, *alone, plunged in her reverie.*

His heart had conceived the divine hope
That * happiness would come ("and") inhabit the ruin,
And that this crumbling roof would see blossom one day
A lily which would fill it with its perfume of love...
Alas! it is necessary that my heart * submit (*subjunctive*)...
The lily has not blossomed, but the humble violet;
And he, always filled with his old (= former) regret,
Has not guessed it by its discreet (*i.e.* modest, unobtrusive) perfume!...
But * hope in me is not "really" stifled:
Just now[17] he treated me as his good fairy,
He blessed (the) heaven which (has) led me here...
Am (*lit.* have) I wrong to hope and to love him thus?
My race (= family), without to-be-worth (*i.e.* being equal to) his, is without reproach;
Moreover, * common poverty (*i.e.* the poverty which we have in common) brings us together;
And always my hope, which cannot * fly-away,
Dreams of remedying (*infinitive*) it, and of consoling (*infinitive*) him...
Yes: this love has taken ("possession of") my soul (quite) entire("ly");
Everything evokes it...

She draws from her pocket a missal.

As far-as to (*i.e.* even to) this book of prayer...
But no! this book is full of my love...("in") The evening,
When Jean has said a word to me which pleases ("to") my hope,
I put a flower there, which dries between the pages...
Dear book, who knowest my longings, and partakest them,
Leaves ("the") confidants and witnesses of my thoughts,[18]
Tell me that he forgets Irène and loves her less,
Although still[19] (= only) just now (*lit.* quite at the hour) he has spoken again of her.
Tell me, tell me, that, faithful to my dream,
I have ("the") right to put again a flower (= one flower more) to-day
Into this book with which I have so much prayed for him!

SCENE V.

VÉRONIQUE, JEAN.

JEAN, *entering livelily.*

What obstinate ill-luck!

---

[1] Note the force of the reflective verb.
[2] *Talma*, a famous French tragic actor (1763–1826).
[3] *Une personne*, "a person;" *personne ne*, "nobody." *Qui est là? Personne.* "Who is there? Nobody." Here the negative is understood—i.e. *personne n'est là.*
[4] *Pichenette* is less usual than *chiquenaude.*
[5] N.B.—*Rien* is literally "thing" (Lat. *rem*). *Bon à rien* = *Je ne suis bon à rien*, "I am not good for anything."
[6] Note *y* (the Lat. adverb *ibi*, "there") is used in French both as an adverb and as a pronoun (*il croit, à toi*). *Allez-y*, "go there." In popular Latin, *ibi* was often used for the pronouns *illi, illis.*
[7] Lit. *un-servre.*
[8] The Muse of Tragedy.
[9] *Deuxième* suggests a series; *second* is simply ordinal. Of a work of three or more volumes, the second is *le deuxième volume*; where there are only two it is *le second.*
[10] *Jamais*, "ever;" *ne...jamais*, "never." *Jamais* may mean "never," the negative being understood. *L'avez-vous vu? Jamais.* "Have you seen him (*or* it)? Never."
[11] *Gentilhomme* is hardly "nobleman" here; but it may have that sense. "Gentleman," as a mere term of politeness, is *Monsieur. Un gentilhomme* is a man of gentle birth, "of good family."
[12] The *s of crois* is dropped, that the ending may correspond with that of *roi* in the next verse.
[13] See Note 10.
[14] This "is" represents the untranslatable *voilà.*
[15] "Catastrophe" does not render the sense of *dénoûment*—the solution (*lit.* unravelling) of a dramatic incident.
[16] The *en* of *s'en aller* (*lit.* of it) = *d'ici*, "from here."
[17] This adverb is used both for the past and the future; it is composed of *tant*, "so," and *tôt*, "soon."
[18] *Penser* is an other and less usual form of *pensée. Penser* is the verb used as a noun, and expresses the act of thinking, while *pensée* is the thing thought.
[19] *Encore* loses its final *e* in verse when the metre renders the suppression of the syllable necessary.

VÉRONIQUE.

What?

JEAN, *in* (*de*, not *en* or *avec*) *a voice trembling with anger.*

Bad news,
As always!...The grain (*pl.*) has fallen more and more.[1]
Against the poor duke who wishes to earn his bread
The rain is demagogic and the wind Jacobin.
To sell ("for") three hundred crowns one's harvest of the year,
(That) is hard!

VÉRONIQUE.

Pardon me if I am astonished,
Monsieur Jean; but this price is nearly (*lit.* at little near) normal,
And you say that in (N.B. *de*) a tone which hurts me.[2]

JEAN.

Ah, truly, I have a (*lit.* the) voice so ironical!...
Well, well![3] (it is that) I am in an ill temper (*lit.* I have * humour[4]), Véronique...
Do you know what (*lit.* that which) Martin has just[5] told me,
What they all ("of them") related at-the market, this morning?
Irène des Aubiers...

VÉRONIQUE, *aside, sadly.*

Ah!

JEAN.

She * marries (=is going to marry)!...
What perfidy! what coquetry!
For when her parents[6] (have) refused me her hand,
She had made me see (=showed me) a less inhuman heart;
She had seemed to (take in) pity my suffering,
Had told me that (the) time, that (the) perseverance,
Perhaps would succeed[7] one day in bending them (*i.e.* making them yield)!
Six months!...She has indeed taken (the) time to reflect...
Six months have (*lit.* are) elapsed...She (of them) marries another (=another one)!

VÉRONIQUE, *aside.*

He loves her still.[8]

JEAN.

The horrible age that ours ("is")!
She!...a noble girl and of well-proved (=attested) descent (*lit.* blood—*i.e.* family),
Do you know what husband she has found after all?
The son of a buyer-up of estates,[9] ("a") ridiculous fop
Who, I do not know how, has taken the particle,[10]
And who, quite enriched by the money of the conquered (ones),
Will pay the marriage-settlement with * blood on his crowns!
Just (=good) heavens! since it is (=there are: *il y a*) women whom one buys (=who are bought),
Where then is your treasure, where then is your hiding-place,
My old manor? Give-back then his gold to your lord,
In-order that he may-be-able, in his turn, to pay himself with * happiness (=to buy happiness)!
But no, ("a") thousand times no! none of those shameful wishes.[11]
And * may-be accursed for * ever the women
Who, as at the field of ("a") fair on the Saint John of Summer (*i.e.* mid-summer day),
Barter their love and sell their beauty!

VÉRONIQUE, *aside.*

How he loves her!

Aloud.

Come (*lit.* see), Monsieur John! Courage!
Can it ("be") that the forgetting of Irène wounds[12] you?
And did you not say that you did not love her any longer?

JEAN.

It (*lit.* that) is the eternal error of (the) irresolute hearts.
I have said it (=so); I have believed it... Good! The thing was certain...
But this cruel vexation (*or* grief) has reopened my wound.

VÉRONIQUE.

Ah! well, if you love her still, in that case
Know if her parents do not compel (*or* constrain) her.
Do not curse[13] her without clearing ("up") your doubts.

JEAN, *bitterly.*

*Women! *[14] you defend yourselves, all of you...
No, I am sure that Irène acts of her full will.
The rich ("fellow") pleases her better than the poor *émigré*.[15]
What! * corn (*pl.*) is * down[16] ("in price"), and I require[17] that one should love me! (*i.e.* I expect to be loved).
Who then would wish ("to have anything to do") with (*lit.* of) me?...Why (*lit.* but), nobody! And you (*lit.* yourself),
Although (*lit.* well that) your feelings are (*subjunctive*) disinterested,
Tell me frankly...

VÉRONIQUE.

Monsieur Jean, (it is) enough!
It is not ("a") question of (=about) me. I am-stopping you.

JEAN.

Ah, pardon! a thousand times, pardon! I lose my (=the[18]) head,
And I become wicked (*or* evil-disposed)...It is necessary to go (=I must go). Let us go (=off)!
For I should hear from here the violins (to) squeak
Of their accursed wedding...it is better (*lit.* is worth more) that I go.
It is well...I will make myself ("a") soldier of Bonaparte.
There (N.B. *lit.* it) falls, on the banks of the Adige and (of the) Rhine,
A hail of lead which cures * grief.
I go[19] to buckle (or strap) my bag, and I leave in an hour.
Your uncle will inherit * the old dwelling;
Live-there both of you (*lit.* all the two) as (*lit.* in) absolute masters...
And pray God for me...when I shall not (=do not) write more (=any longer). *He goes out from the left* ("*side*").

SCENE VI.

VÉRONIQUE, *alone.*

He loves her still[20]...always...And I...I (I) was mad![21]
When he said to me a good (=kind) word,
It was out of (*lit.* through) friendliness (*or* good-nature), as one does to (—"the") children...
I do not wish to love him any longer. No! I forbid it to myself.
What can I ("effect") on a heart which only (*ne...que*) beats for her?
However, the illusion was very natural:
His voice became soft (*or* gentle, sweet) in (=when) pronouncing my name;
His look (*or* glance) became tender (*lit.* softened itself)...But no!
If I hoped still, I would be foolish (*or* senseless[22]).

Looking-at her missal, which she has kept in her[23] *hand.*

And you,[24] ("my") book filled with-the[25] flowers of my thought,
Yes, you whom my dispelled (*lit.* annihilated) dream still perfumes—[26]
Humble and dear confidant, you had then lied to-me!...
Ah, courage! my heart must free itself
From all those memories...I will[27] burn this book,
And flee ("from") this house, where I have too much suffered.[28]
In the near (*or* neighbouring) convent shelter is offered me;

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1 *De plus belle* = *de plus en plus.*
2 This familiar idiom hardly bears translation: "gives (*lit.* makes) me pain."
3 *Parbleu* is a mild oath, in which *dieu* is disguised.
4 Note the sense of this word ("disposition," "temperament") in the phrase "*avoir de l'humeur.*"
5 *Lit.* comes from to tell (=telling) me. Note this usual way of expressing what has just been done.
6 *Parents* also means "relatives."
7 *Parvenir* is "to attain," "to arrive at a goal or end." *Succéder* is "to follow," and "to be successful."
8 *Encore* loses its final *e* in verse when the metre renders the suppression of the syllable necessary.
9 *Biens* has a wider sense than "goods."
10 The *particule* referred to here is the preposition *de* which precedes the name of the place that gives a noble his title. It does not, however, always indicate aristocratic birth.
11 No English word covers the sense of *vœux*, "vows," "prayers," "desires," "wishes."
12 To wound is *blesser*. *Outrager* has not here so violent a sense as "outrage."
13 "Curse" is here almost too strong: "condemn," rather.
14 This exclamation, *les voilà* (*lit.* see them there), is untranslatable. Jean means to say, "Here is (referring to Véronique) a specimen of them."
15 It is better, perhaps, to leave this word untranslated; it is used here in the restricted sense of an "emigrant" royalist, an exile during the Revolution.
16 *Baisse* = decline, falling.
17 N.B.—*Prétendre* means not only "to pretend," but "to claim," "to insist."
18 *Ma* is not used in such a case in French; the head could not be other than Jean's.
19 Note this use of *aller*. *Je vais faire une chose*, "I am going to—am about to—do a thing."
20 See note 8.
21 *Fou, folle*, is both "foolish," "mad," and "madly in love."
22 "Senseless," when it means unconscious, is *sans connaissance*.
23 Note again the article, the possessive pronoun being unnecessary
24 "Thou" would be too high-flown here.
25 Note the *de*; *avec* generally means "along with."
26 *Embaumer* is also "to embalm."
27 See note 19.
28 Note the position of *trop*.

I will go there...for I must[1] forget (*subjunctive*) and go away[2] (*subjunctive*).

**Approaching*[3] *the fireplace.*

Here are[1] * just some shavings, ("and") some straw:
An-I this desert("ed") fireside, where the cricket is silent (*lit.* has silenced itself),[4]
To-day will receive the farewell of Cinderella...
Disappear, sole witness of my sad folly.

She places her book on the straw heaped in the hearth, and puts to-it (the) fire (= sets it on fire) with a little lamp which is hung (lit. *hooked*) *in the inside of the fireplace. A great flame bursts out.*

Yes, the flame rises, and the work is accomplished (= it is done).
The leaves, quite blackened, writhe (*lit.* twist themselves) in the fire...
Mount then, pure flame, with my last sigh![5]
With my last sigh mount, white smoke,
Which goes away (*lit.* who goest away) into (the) heaven sweetly perfumed,
Since I feed you, in this day of sorrows,
With a double incense, *prayer and *flowers!
Rise then (as-far-as) to God, flame of (—the) sacrifice,
In-order-that to him (*lit.* that one) whom I love it may become propitious,
And, if Jean suffers still from his former love,
In-order-that at-the least my unhappiness may alleviate * his!

The fire has quite gone out.

The fire is-going-out! Such is my heart—cinder (*or* ashes) and dust!

Observing at the back of the fireplace a gaping hole which was not there before.

Come! (*or* Stop! *lit.* Hold!)...But this blaze has made fall a stone
From the hearth...Each (= every) day these walls crumble a little,
And "it is" so long that one had not made of fire (= since any fire has been made)!...
Let us see then...The damage is not great, I suppose.

Astonished.

But it is a hiding-place...Ah, goodness! the strange thing!...
A little chest!...

She takes the chest which is in the hole.

From the flame it is quite warm still...
Could it open itself? (= Could it be opened? Note the force of the reflective verb.)

She carries the chest on the table and forces herself to open it (= exerts herself to open it).

Yes!

With amazement.

The treasure! the treasure!
I have found this—I!...Am I really awake?
But no, this little case in iron, quite rusted,
I touch it...

Taking with full hands (= by handfuls) the ornaments[6] *contained in the chest.*

Here are the jewels...and my eyes
Have pain (= are scarcely able) to bear their wonderful brightness!...
But why so much (of) trouble, and what is my thought?
God heard me: my prayer "is" granted.
Thanks to my sacrifice, he has made me (= caused me to) discover
This treasure by which (*qui* for *lequel*) Jean will (*lit.* goes to) cease to suffer.
My consumed hopes give him back his wealth,
In-order-that he may marry Irène and make her ("a") duchess;
And, as by ("a") miracle and by enchantments,
My tears have (*lit.* are) become pearls and diamonds!
Alas! my poor love!

Seeing Jean, who re-enters pensive and the (lit. *his*) *head low* (i.e. *bent*).

Jean! Ah! how to tell him?...

SCENE VII.

VÉRONIQUE, JEAN.

JEAN.

Just now (*lit.* quite at the hour) I had a moment's frenzy,
(My poor[7]) Véronique...It is necessary to (= you must) forgive me.
But I have not the right to forsake you,
Your uncle and you. I must retain the modest lot (*i.e.* position)
Which I make you share here; and I ("shall") stay.

VÉRONIQUE, *near* (*of*) *the table, so as* (lit. *of manner*) *to hide from* (note the *à*) *Jean the chest.*

Monsieur Jean, it is not that (*lit.* it is not of that that it concerns itself[8]).

JEAN.

What?

VÉRONIQUE, *forcing herself to smile.*

I am your fairy...Ah! you (have) told me it (= so)...
Well! on-the bad days the fairy is there who is-on-the-watch,
And who repairs all (= sets everything right) with (*de*, not *avec*) a single stroke of ("her") wand.

JEAN.

Are you joking?

VÉRONIQUE.

All is-going to change in our lot.
For a great joy are you strong enough?

JEAN.

For a great joy?

VÉRONIQUE.

Oh yes! For it *is one
To resume at once (at, *lit.* of) a stroke one's rank and one's fortune,
And the woman whom one loves, and the happiness dreamt ("of")...
The treasure...

JEAN.

The treasure?...Well?

VÉRONIQUE, *showing* (*to-*) *him the open chest.*

I have found it!

JEAN.

* "Good heavens!"[9]

VÉRONIQUE.

Is it not? What ("a") stroke of destiny!
I have discovered it there, in that fireplace;
I will tell you later...by (= through) the fire that I (have) made.
But it is indeed it...touch...look...

JEAN, *seizing in his turn the ornaments.*

In effect (indeed),
It is indeed it...it is indeed (there) the treasure of family (= the family treasure).
What! it is to-me (= mine, *le mien*) this heap of diamonds which shines (= shining heap of diamonds)...
Mine all these jewels!...

He rests (i.e. *stands*) *motionless and silent, the* (= *his*) *hands full of jewels, absorbed in his contemplation.*

VÉRONIQUE.

Now you can
Bring your Irène within these raised-again walls;
You can give her wealth and rank...

Perceiving that Jean does not listen to her.

But he does not hear me more...Come, no weakness!
I must depart...

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[1] and [2] These expressions have been explained. Note the subjunctive (*oublie* and *aille*) after *il faut que*.

[3] *Approcher* is both transitive and intransitive in French. *Approcher une chaise*, "to bring a chair up or near."

[4] Note again that the reflective (or, as it is sometimes termed, the pronominal) verb is conjugated with *être*.

[5] *Vœu*, "vow," "prayer," "desire." Sigh is *soupir*.

[6] *Parure* generally means, as here, ornaments that are worn on the person—gems, dress, etc.

[7] Sometimes this *pauvre* may be rendered "dear."

[8] *Agir*, "to perform," "to act," "to work;" *s'agir de*, "to be the matter in question." *De quoi s'agit-il?* "What is it about?"

[9] *Lit.* Great (= good) God! But *Dieu!* does not shock the ear as either vulgar or irreverent.

OUR TUTORIAL SECTION

THE L.L.A. OF ST. ANDREWS.

B.—THE DEPARTMENT OF PHILOSOPHY.

LOGIC AND METAPHYSICS.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),
Author of "Mental Science and Logic for Teachers."

Ryland's "Psychology," 152 to the end.

Chap. viii.—The question as to subconscious ideas need not trouble the student at this stage. Wundt's view is the most reasonable—namely, that a brain change corresponds with a mind change; that the brain change tends to recur and to produce the mind change with which it is connected. There is a close connection between "after images" and retention. Sensations persist after the removal of the stimulus that caused them, and so ideal life commences as soon as sensations begin to be received.

The chief difference to be noted between memory and imagination is that the former is merely reproduction of previous experiences, whereas the latter includes rearrangement and selection; hence imagination is a step higher in mental development than mere memory.

Note the four meanings given to the term *memory*—namely, (1) *Retention*, (2) *Recognition*, (3) *Memory*, (4) *Imagination*; and distinguish clearly between reproductive imagination, in which there is no elaboration by the mind of the remembered impression, and productive or constructive imagination, in which the image owes much to the action of the mind in either omitting or adding to the remembered impressions.

Association of Ideas.—As Ryland says, this principle plays an important part in English systems of psychology. It is probable that its importance has been exaggerated, and that not nearly so large a part is played by it as is represented by Mill, Bain, and Spencer. Still there is no doubt of the fact that the laws of *Contiguity*, *Similarity*, and *Compound Association*, with which the student must be well acquainted, express very important truths of mental science, especially with respect to memory. It is evident to the least reflecting man that like recalls like, and that the connected recalls that with which it is connected, and this is what is meant by the association of ideas. By *obstructive association* is meant the power of a mental predisposition to prevent us from recognising what we are seeking, even though it presents itself to our minds. This is well expressed in (iv.), p. 164. Note also the statement of Höffding, on p. 165, as to the recall of the whole, and not of the part only, of an associated aggregate. Observe the law of contrast of Hamilton, and compare it with Bain's "likeness in diversity." The reality of obliviscence or forgetfulness needs no argument to establish it, hence the conditions of revival (p. 170) will be means whereby this decay of impressions may be obviated. There must be some physical basis of memory—that is, some modification of the brain and nerves must take place when an impression is received, although it is not easy for the physiologist to state clearly in what this modification consists. It appears certain that a "track" is made which is traversed more and more readily by the impression with each succeeding experience thereof. The student need not bother much about this. What she must know is (*a*) the meaning of the term "association of ideas," and (*b*) the laws which govern its action.

Chap. ix.—Thinking is an act of mind in which, by virtue of the retentiveness which we possess, and of our knowledge of likeness and difference, we become aware of the resemblances and differences that exist between mental impressions.

In respect to **conception,** the question is whether or not we can have a notion of a class of resembling objects without having at the same time an image in the mind of one of these objects that is taken as a type of the whole. In so far as use is made of this typical object, the process **is** imagination; but in so far as the mind is capable of forming a general notion of the necessary similarities common to all the members of the class, without including any of the qualities peculiar to the various members thereof, the process is something quite different from imagination. This brings us to the opposed schools, of nominalists and conceptionalists, with which we have already dealt (see Jevons).

In reading the section on language, the student should turn to Jevons' chapter on language, and again revise that part of her work. The close connection between language and thought is admitted on all sides, nor will there be any who will deny that, whether or not we may be able to think in an elementary way without recourse to language, it is absolutely necessary to complex and sustained thought that language should be employed. It is not as a means of communication, nor as a means of record and reference, that language is most valuable to thinking men, but as an instrument which makes it possible for profound and sustained reasoning to be mentally indulged in. The interconnectedness of conception, abstraction, generalisation, and classification has already been dwelt upon, and the difference between inference and intuition should present no difficulty to the student who has understood the early chapters of Mill's "Logic."

Chap. x.—As soon as the idea of succession has been grasped by the mind, we get a conception of time. It does not matter what the impressions may be, so soon as we recognise one as following or preceding another, we have the data upon which to proceed in getting a meaning of the term *time*. Note Locke's statement, that "**reflection** on these appearances of several ideas one after another in our minds," furnishes us with the idea of succession, and so of time. Note carefully how (p. 203) the idea of time as duration is arrived at, and so on to the difference between present, past, and future.

Self pure and empirical.—The first is the experience of all impressions which is thought of as the knowing part of nature. The second is the peculiar own self comprising within its being the complex group of phenomena referred to on p. 209. This self is known to us only after long experience and much inference, just in the same way as comes our knowledge of external nature. It will interest the student to follow out the steps in this process of getting a knowledge of self, but it is not a very important part of this branch of our subject.

Chap. xi.—This chapter must be studied carefully until a correct idea of the simplicity of feeling and the complexity of emotion is arrived at, and also a knowledge of how the simple sensation becomes transformed into the more complex emotion. The connection of pleasure with medium activity cannot be doubted, whether this activity be physical or mental, so the student will be wise to remember well Bain's law of self-conservation.

It will be very profitable to dwell upon the Classification of the Feelings (pp. 228-236), and it will be just as easy as it will be profitable. Note especially the importance and peculiarities of the æsthetic emotions (p. 237), and their bearing upon morality.

Although at first it may seem paradoxical to state that feeling both hinders and promotes thought, a little reflection will show not only how true this is, but also how necessarily it is true. We have but a limited amount of vital force available, and if this is expended in one species of mental activity, it cannot be available for other species. Intense feeling is inimical to both thought and volition. On the other hand, the chief law of attention is that we attend to what interests us, and, as Ryland observes, interest is only another name for a pleasurable feeling. The thought element in emotion is very important from the standpoint of the revival of emotion, which is only possible indirectly or by means of the intellectual states with which they (the emotions) are connected. The section on *Belief* may be omitted, as authorities are greatly divided as to what is the characteristic of this state of mind, which certainly leans towards feeling, and just as certainly towards thought.

Chap. xii.—Volition closely resembles feeling, but it is characterised by *activity*. Having a desire for the achievement of a certain purpose, I feel myself impelled towards the attainment

thereof, and it is this activity, straining towards the accomplishment of a known and desired end, that is called will or volition. This is well put at the bottom of p. 246, which passage should be read with care. The list of voluntary and involuntary movements should be committed to memory, and it should also be noticed that from (1) to (5) there is a gradual transition towards a "conscious recognition of an end to be obtained," but only the fifth group is strictly purposive. The elements of a "typical, simple, voluntary action," as set out on p. 250, must likewise be pondered over and learned by heart. It is important to remember that "in all voluntary action we find comparison of ends and of means to effect those ends." The best meaning to attach to the word "motive" is that of Professor Baldwin, as given in (3), at the bottom of p. 252. The origin of voluntary motion is closely wrapped up with the law of conservation, as given above. When once a movement has caused pleasure or the relief from pain, the idea of the pleasure is connected with the motor idea —that is, a mental picture of the movements necessary to bring about the realisation of the pleasure—and the idea of the pleasure thus tends to bring about the desired movements, from which comes the pleasure which is the object of desire. Note the various hypotheses as to the nature of the movements concerned in the initiation of volition. The steps referred to on pp. 255 6 will be easily understood.

Desire is the antecedent to all volition. It is the name of the initial feeling of want, to realise which is the aim of volition. It is best to regard the appetites as less intellectual and more instinctive than desire. Both agree in supplying motives to action. The growth of desire (p. 258) should be well noted. If we do not always desire pleasure, as Ryland claims to be the case, it is at least certain that the connection between desire and pleasure is of the closest. It would perhaps be better to state that we do not always desire what ultimately proves to be pleasure, although at the time of desiring we think that what we are wishing for will certainly bring us pleasure. The point is a very moot one, and it will be profitable for the student to weigh the *pros* and *cons*, and then to see what conclusion forces itself upon her. Is the control of thoughts and feelings an acquisition resulting from muscular control? It seems at least highly probable that this is indeed the case. Attention is certainly the result of an effort, which appears to be an effort of muscular control. Again, the repression of the outward signs of emotion is highly conducive to the repression of the feeling itself, and, of course, the repression of the expression of feeling is the result of muscular control.

Habit will present no difficulty. The conditions governing the strength of habit (p. 267) should be studied and remembered. The remainder of the book, on *Instinct* and the *Higher Development of the Will*, will instruct the student, but questions on these sections are not very likely to be set.

Berkeley.

Introduction, xxxi to end.—The question under discussion is still the familiar one—namely, Are objects merely sensations? If so, they do not exist when not perceived. The answer is given on page xxxiii: "God, as supreme Reason and Will, is accustomed to maintain sensible things and their natural laws as we find them." The impressions will always be given, not because they result from inanimate matter, but because they are due to the inbreathing, as it were, of God. The argument is that knowledge of what we call objects is limited to impressions from which we infer the existence of objects; but should God give us the impressions, it would be just the same, so far as our experience goes, especially if the impressions were to be continuous on every sentient mind. This is the burden of the remainder of the Introduction, which we may now leave, and turn to the study of Berkeley himself. The *Introduction* and the *Prefatory Note* should be read again after the principles have been mastered.

Berkeley's Introduction.—The question raised by Berkeley as to whether or not abstract ideas, as opposed to images, exist is a vexed one with which we have already dealt, and concerning which we have arrived at a different conclusion from Berkeley, whose opinion, given in section 10, p. 18, should be carefully noted. Moreover the student should be strongly recommended to look within her own mind in order to ascertain whether she can form a general notion of, say, mankind, without imaging a particular man who is taken as a type of all. Berkeley's remarks concerning language, and especially the passage (p. 28) where he imputes to language the blame for man's self-deceit in respect to abstraction and the formation of general notions, should be carefully read; also the remedies suggested by our author for the abuse of words deserve careful weighing.

The Principles.—Fraser's footnote as to the various meanings of the word *ideas* should be attentively studied. See also the footnote on p. 39. In section 4 we come upon the first statement as to the non-existence of objects. "In truth, the object and the sensation are the same thing, and cannot therefore be abstracted from each other." The only "being" is "being perceived or known:" this is the meaning of the assertion concerning things that their *esse* is *percipi*. Hence "there is not any other substance than spirit, or that which perceives." This leads to the discussion of primary and secondary qualities: the former meaning *extension, figure, motion, rest, solidity, impenetrability*, and *number;* the latter, *colours, tastes, sounds*. The division is a very pertinent one, as the following quotation from Sully goes to show:—"The superior importance of such qualities as size, figure, and weight turns on a number of considerations. To begin with, all objects have some sort of figure, size, and so on. What we mean by a *thing* or a material body is something made up of figure, size, hardness, weight, etc. On the other hand, there are many things which have little or no smell or taste. Again, the former qualities are, comparatively speaking, constant or unchanging in the case of the same object. A stone is always the same as to size, hardness, and weight. On the other hand, a body is only sonorous when put into a peculiar condition of vibration, and a fragrant body varies considerably in the degree of its fragrance according to circumstances. Finally, different persons agree very much more respecting the size or weight of an object than respecting its taste or smell: the former impressions vary less with the state of the individual organ than the latter. Hence the former aspects of objects have been erected into a higher class under the name of primary qualities, while the latter have been marked off as secondary qualities."

Berkeley goes on to argue that primary as well as secondary qualities are simply sensations dependent for their existence upon a conscious mind, and that there is no more warrant for arguing that objects are real because of their primary qualities than there is from their secondary qualities. (See Fraser's note at the foot of p. 46.) Then comes the peculiar doctrine that Berkeley was the first to propound—namely, that there is *no substratum*, that is, that objects are merely bundles of sensations. The sections dealing with this, beginning at section 17, are of the first importance, and must be carefully read. The student may usefully be reminded of two facts: one is that the plain man believes unhesitatingly that there *is* a substratum, and, moreover, he has always held this belief—which is a very strong argument in favour of its truth; also the philosopher may and does argue that there is knowledge other than that gained by sensuous perception. It is claimed that there is an internal reflection or intuition whereby things are known without any sense impressions as a guide to their knowledge. It is in this way that a belief in the reality of objective nature arises. We experience sensations; we intuit the existence of a substratum, or support, in which the qualities causing these sensations inhere. Berkeley's explanation, of course, is that the sensations are caused by the Supreme Spirit, who breathes into us the stimulus which we interpret as coming from natural objects. Observe that Berkeley believes in the existence of self: "I know or am conscious of my own being, and that I myself am not my ideas. But I am not in like manner conscious of the existence or essence of matter" (see footnote, p. 51).

The next point to attend to is the statement on p. 57—namely, that, "the absolute existence of unthinking things are words without a meaning." This leads up to the position that we are conscious of a succession of ideas, and that there must be some cause of these ideas, the which he explains is "an incorporeal active substance or spirit." From this it follows that "the ideas imprinted on the senses by the Author of nature are called *real* things; and those excited on the imagination being less regular, vivid, and constant, are *images of things*."

Note the curious point on p. 65 that there is no banishment of all that is substantial and real out of the world. Things are real, permanent, and substantial as ever, but no longer must they be regarded as having any existence in themselves; they are simply the groups of sensations that are perennially being given in the same way to all men by the Supreme Spirit—a hypothesis which is of course possible, but which is of the most unsatisfactory kind, known as an unproved, if not an unprovable, hypothesis. See and carefully study section 35, p. 66. Of the other objections, the most important are: (1) that referring to the evidence of our eyes because of the connection with Berkeley's famous theory of binocular vision, in which it is explained that we have two different impressions—namely, one by each eye, but only one sensation, which is perfectly true, and for which Berkeley is justly regarded as one of the originals amongst philosophers; (2) that referring to natural causes which must be regarded as simply the working of the Supreme Spirit in divers ways, yet always consistently, so as to give the impression of a cosmos and not of a chaos. As to matter being inert and incapable of causation, that is accepted, and is expressed in the statement that inertia is one of the most general of properties

of matter; but to this is added the further statement that there is in nature another thing—immaterial, it is true, but none the less real on that account—namely, *power* or *energy*, and this it is which, as says Berkeley, is ascribed by certain philosophers to God. In section 34 the argument is against the belief in the existence of matter, simply because men assent to this belief. The student will do well to tabulate all the various objections that have been dealt with; we shall consider Berkeley's statements, from the eleventh objection upwards, next month.

Questions.

RYLAND.

1. Divide and subdivide the facts of mind, and show how the different classes are mutually related. How would you class the mental relations involved in (*a*) the prick of a pin, (*b*) the rush of indignation at a mean act? (1891.)
2. Give an account of the muscular sense and the part it plays in our perception of space and of objects in space. (1891.)
3. What is meant by the association of ideas? State and exemplify the chief laws. (1891.)
4. Analyse the state of mind called desire, and show its relation to feeling and volition respectively. (1891.)
5. Analyse an act of volition into its elements. What rules would you lay down for training the will? (1892.)
6. Give an account of the various forms of imagination, and distinguish accurately between memory and imagination. (1892.)
7. Give a careful account of the mental processes involved in (*a*) perceiving, (*b*) conceiving. (1893.)
8. Trace the stages in the development of emotion, and give a general classification of feelings. How do you distinguish between feeling and knowing?

BERKELEY.

1. Give carefully an account of the primary and secondary qualities of matter. (1888.)
2. Summarise Berkeley's arguments against "abstract ideas." Indicate his position. (1890.)
3. Explain Berkeley's theory of suggestion or acquired perception as applied to vision. (1890.)
4. How does Berkeley explain (*a*) the permanence, (*b*) the apparent independence of material things? (1890.)
5. Explain the account of "universal notions" given by Berkeley in the Introduction to *The Principles of Knowledge*. What view is he combating? (1891.)
6. "Though the ideas themselves do not exist without the mind, yet there may be things like them whereof they are copies or resemblances." How does Berkeley meet this argument? (1891.)
7. Explain carefully what Berkeley meant by the reality of the external world. How does he distinguish sensible things from ideas of the imagination? (1891.)
8. Explain and criticise Berkeley's theory that the Author of Nature imprints ideas on the senses. (1892.)
9. What difficulties and errors spring, according to Berkeley, from the doctrine of abstract ideas? (1892.)
10. State and criticise the views of Berkeley and Mill of causality in the phenomenal world. (1892.)

N.B.—The remainder of the questions on this part of the work will be given next month.

In reading the *Psychology*, *Mental Science and Logic for Teachers* should be referred to constantly, as it will be found helpful in putting things clearly.

LONDON MATRICULATION.

June 1899.

BY R. C. B. KERIN, B.A. (LOND.),

First in First Class Classical Honours at Final; Principal, Carlyon College, 55 and 56 Chancery Lane, W.C.,

AND

E. J. SCHWARTZ, M.A., B.SC.,

Late Scholar of St. Catharine's College, Cambridge.

LATIN.

Course for May.

1. Cicero, *Pro Marcello*. Revise the second half.
2. Grammar.—Learn the rules for *oratio obliqua*. Learn the uses of the various temporal conjunctions. Learn the Roman calendar thoroughly. Note the Roman system of (*a*) money, (*b*) names. Suffixes and prefixes are important.

Revise the accidence of nouns, pronouns, adjectives, and adverbs. In the Syntax, revise the cases, adjectives, and pronouns.

3. *Anglice Reddenda*, 84–90.
4. Sentences from Bradley's *Arnold* or Bayfield's or Allen's *Exercise Book*.

Latin Grammar Notes.

The definition of *oratio obliqua* is very important.

Three changes occur in passing from *oratio recta* to *oratio obliqua*—(1) mood, (2) person, (3) tense. The verb in the principal clause, as a rule, becomes the infinitive; the imperative, however, becomes the subjunctive, and questions are put in the subjunctive if they are real questions, and in the second person. The verbs in the subordinate sentences are put into the subjunctive. The tenses of the subjunctive are usually secondary. The first and second persons in *oratio recta* become the third person in *oratio obliqua*.

The following passages of *oratio recta* and *oratio obliqua* are taken from the *Elementary Latin Grammar* by Professors J. Roby and A. S. Wilkins (Macmillan). Students will do well to go over these passages carefully.

Oratio recta.—Si pacem populus Romanus cum Helvetiis faciet in eam partem ibunt atque ibi erunt Helvetii ubi tu eos constitueris; sin bello persequi perseverabis reminiscetor et veteris incommodi populi Romani. Quod improviso unum pagum adortus es ne ob eam rem aut tuae magnopere virtuti tribueris aut nos despexeris. Quod si veteris contumeliae oblivisci volo num etiam recentium iniuriarum quod me invito iter per provinciam per vim temptastis quod Aeduos, quod Ambarros, quod Allobrogas vexastis memoriam deponere possum?

Oratio obliqua.—Si pacem populus Romanus cum Helvetiis faceret in eam partem ituros atque ibi futuros Helvetios ubi eos constituisset: sin bello persequi perseveraret, reminisceretur et veteris incommodi populi Romani. Quod improviso unum pagum adortus esset, ne ob eam rem aut suae magnopere virtuti tribueret aut ipsos despiceret. Quod se veteris contumeliae oblivisci vellet num etiam recentium iniuriarum quod se invito iter per provinciam per vim temptassent quod Aeduos, quod Ambarros, quod Allobrogas vexassent, memoriam deponere posse?

Note, in the above—(*a*) *faciet*, future indicative, becomes subjunctive imperfect on account of the sequence of tenses; (*b*) *ibunt* becomes *ituros*, because the verb of the principal clause is turned into the infinitive, while its subject, *Helvetii*, becomes the accusative, *Helvetios;* (*c*) *constitueris*, future perfect indicative, becomes pluperfect subjunctive, and the second person is changed into the third person; (*d*) *reminiscetor*, the future imperative, becomes the imperfect subjunctive, third singular; (*e*) *ne tribueris*, the perfect subjunctive with *ne*, expressing a prohibition, becomes the imperfect subjunctive with *ne*, and is changed into the third person; (*f*) *tuae* becomes *suae*, not *eius*, as it refers to the subject of the verb *tribueret;* (*g*) *nos* becomes *ipsos*—if *se* were used instead of *ipsos*, it would more naturally refer to the subjunctive of *despiceret*; (*h*) *possum* becomes the *infinitive*, as it is a *rhetorical* question; (*i*) *me* becomes *se*.

The numerals must be known. Dates, too, are important. Note the following typical cases:—

July 1	...Kalendis Iuliis	...Kal. Iul.
July 3	...Ante diem quintum Nonas Iulias	...A.D. V. Non. Iul.
July 7	...Nonis Iuliis	...Non. Iul.
July 10	...Ante diem sextum Idus Iulias	...A.D. VI. Iul.
July 14	...Pridie Idus Iulias	...Prid. Id. Iul.
July 15	...Idibus Iuliis	...Id. Iul.
July 23	...Ante diem decimum Kalendas.... Sextiles	...A.D. X. Kal. Sext.
July 31	...Pridie Kalendas	...Prid. Kal.

Remember the rhyme for the date of the Nones and Ides:—

"In March, July, October, May,
The Nones are on the seventh day."

The Ides are, then, on the fifteenth.

Note that *before* 45 B.C., March, July, October, and May had 31 days, February 28 or 29, and the rest had only 29, not 30. Remember this if the date given to you is then in a year preceding 45.

The year is expressed by the *ordinal*, and not by the *cardinal*—for example, 154 A.U.C. (*ab urbe condita*) is: *Anno centesimo quinquagesimo quarto ab urbe condita.*

Note how to express 50 B.C.:—*Anno septingentesimo quarto ab urbe condita.* Rome was founded in 753. Now, 753 − 50 + 1 = 704. Therefore, 50 B.C. is the seven hundred and fourth year from the foundation of the city. Note that you have to add one after subtracting, owing to the practice of inclusive reckoning.

Note that "on July 10" is *ante diem sextum Idus Iulias*, "before July 10" is *ante ante diem sextum Idus Iulias*. All such expressions as *ante diem sextum Idus Iulias* were regarded as nouns, and any preposition can be used before them.

It is also important to know the fractions of the *as*, as they are used in denoting the portion of an inheritance received, and also in calculating interest—for example, *Heres ex quadrante patri factus est*, "He was left heir to one-fourth his father's property;" "He lent him 200 sesterces at 3 per cent., "*Ei ducentos sestertios mutuos quadrante dedit*. The *as* was regarded as 1 per cent. per month—that is, 12 per cent. per annum; therefore *quadrans*, quarter of an "as," is quarter 12 per cent.—that is, 3 per cent. The interest is put in the ablative.

With regard to sesterces, note the following types:—

1,000	sesterces	= *mille sestertii.*
2,000	,,	= *duo milia sestertium* (genitive plural), or *bina sestertia.*
2,000,000	,,	= *vicies* (*centum milia*) *sestertium.* (*Sestertium* is here irregularly regarded as a single neuter noun, and declined accordingly, though it is really the genitive plural.)
3,230,224	,,	= *tricies bis* (or *ducenta*) *triginta milia ducenti viginti quatuor sestertii.*

Note that 1,000 H.S. = £8, 10s. If you are given English money, you must turn it into Roman money, and then translate.

Typical Sentences.

34. "If any one were to say that you were the fourth who formed this plan, you would not be satisfied."

Si quis te quartum hoc consilium iniisse dicat, non sis contentus.

Notes.—(*a*) Subjunctive with *si*, because subjunctive is used in principal clause. (*b*) Note how the English ordinal is translated as a complement of the verb "to be."

35. "Do not be afraid as if you were giving a penny to an elephant."

Noli timere quasi assem elephanto des.

Notes.—(*a*) Note how the prohibition is expressed. *Ne timueris* would also be correct. (*b*) *Quasi*, *velut si*, etc., are followed by the subjunctive. The apodosis to *des* is suppressed; if expressed, it would be in the subjunctive, therefore *des* is in the subjunctive.

36. "Most people thought that if news of Pompey's defeat had not come, then Domitius would have taken the city by storm."

Nisi tum nuntii de Pompeii clade essent allati, plerique Domitium urbem expugnaturum fuisse existimabant.

Notes.—(*a*) The apodosis in this sentence is not "most people thought," but "would have taken." We have seen before that "would have" in a principal clause is expressed by the pluperfect subjunctive. It is not permissible here, however, to use the pluperfect subjunctive, as the "would have" sentence is introduced by "that," and depends on a verb of "thinking," which requires the infinitive. Now, "would have," when the infinitive is required, is expressed in two ways: (1) if the verb is active, and has a supine, by the future participle with *fuisse*; (2) by *futurum fuisse ut* and the imperfect subjunctive, if the verb (*a*) has no supine, or (*b*) is passive. Hence above we have *expugnaturum* (agrees with *Domitium*) *fuisse*. (*b*) *Essent allati* is in subjunctive, because the apodosis "if" in *oratio recta* would be in subjunctive. (*c*) "Of," when equivalent to "concerning," is often translated by *de*. With verbs it is generally translated in this way—for example, "I speak of you," *De te loquor*. (*d*) Distinguish *plerique*, "most people," from *plurimi*, "very many."

37. "No one told me what your friend would have done if he had known that the army had been on the brink of destruction."

Nemo quid amicus tuus facturus fuerit mihi dixit si haud multum abfuisse quin exercitus periret sciviset.

Notes.—(*a*) The apodosis to the "if" clause is again in a dependent clause—namely, in an indirect question clause depending on *dixit*. The apodosis containing "would have" would in *oratio recta* be pluperfect subjunctive; therefore, according to the rule, the verb in the "if" clause is in the subjunctive, hence we write *sciviset*. (*b*) In dependent questions and in consecutive clauses (that is, in clauses expressing result, introduced in English by "so that"), "would have," if the verb is active, is expressed by the so-called periphrastic subjunctive (that is, by the future participle and the perfect subjunctive of *sum*). Hence above we write *facturus fuerit*. (*c*) Note how to express "on the brink of"—literally, "it was not much absent but that."

38. "We said that if we had ordered you to go to Rome the town would not have been lost."

Si tibi ut Romam ires imperavissemus futurum fuisse ut oppidum amitteretur negavimus.

Notes.—(*a*) The subjunctive *imperavissemus* is used as before, because the apodosis is "would have been lost." (*b*) "Would have been lost" has to be translated by the infinitive, because verbs of "saying" require the infinitive when in English there is a "that" clause or its equivalent. Now, "would have been," when the infinitive is required, is translated by *futurum fuisse ut* and the imperfect subjunctive passive, in accordance with the rules given above. (*c*) Note that in English, where we say, "say .....that not," the Latins place the negative with the verb of saying, and use *nego*—literally, "deny that." (*d*) Be careful not to use the infinitive after *impero*, "order." The only verb of ordering that normally requires the infinitive is *iubeo*. Be careful, too, not to use the accusative with *impero*. The person to whom an order is given is put in the dative; the thing that is ordered is put into the accusative.

39. "I should not hesitate to say that all wise men are always happy, if your friend were able to convince me that men can always be happy."

Non dubitem dicere omnes sapientes semper esse beatos si amicus tuus homines semper esse beatos posse mihi persuadere possit.

Notes.—(*a*) The present subjunctive is used in both clauses, because (1) there is a "should" in the apodosis, (2) the condition refers to future time. (*b*) *Non dubito*, "I do not doubt," followed by a "that" clause, requires *quin* and the subjunctive in Latin. When, however, *non dubito* means "I do not hesitate to," use the infinitive in Latin, as in the sentence above. (*c*) *Persuadeo* governs the dative. (*d*) When *persuadeo* is followed by an infinitive in Latin, it means to persuade or convince a person that a thing is so. When it is followed by *ut* and the subjunctive, it means to persuade a person to do a thing.

Test Paper In Catilinam I., chap. vii. to end.

1. Translate—(*a*) § 18, Superiora illa.....desinam; (*b*) § 24, Quamquam.....tulisti.

2. Write grammatical notes on the following passages:—
   (*a*) Ut *domi meae* te adservarem rogasti.
   (*b*) Cum a me id responsum *tulisses* me nullo modo eisdem parietibus tuto esse tecum qui magno in periculo *essem* quod eisdem moenibus *contineretur*.
   (*c*) Faciam ut intellegas quid hi de te *sentiant*.
   (*d*) Te ut ulla res *frangat?*
   (*e*) Sed est *tanti* dummodo calamitas a reipublicae periculis *cingatur*.
   (*f*) Quamquam quid te *invitem*, a quo iam *sciam* esse praemissos qui praestolarentur.
   (*g*) Habes ubi *ostentes* tuam praeclaram patientiam famis.
   (*h*) Quare *secedant* boni.
   (*i*) Nonne hunc in vincula *duci* imperabis?

3. Distinguish *egredĕre* and *egredēre*; *moenia*, *murus*, and *paries*; *multo* and *multum*; *ut non* and *ne*; *simulo* and *dissimulo*; *animadverto* with the accusative, and *animadverto* with *in* and the accusative; *nescio quo pacto* (*a*) with indicative, (*b*) with subjunctive.

4. Write notes on the following passages:—
   (*a*) At persaepe etiam privati in hac republica perniciosos cives morte multarunt.
   (*b*) An leges impediunt quae de civium Romanorum supplicio rogatae sunt?
   (*c*) Ad summum imperium per omnes honorum gradus extulit. Mention the *gradus honorum*.
   (*d*) *Forum Aurelium.*

5. Give the meaning of—*latrocinium*, *praestolarentur*, *duint*, *querimonia*, *multare*, *patres conscripti*, *naufragi*, *bacchari*, *recta perge*, *libera custodia*, *subsellia rum*.

6. When is *non modo* used instead of *non modo non?*

7. Write lives of the Gracchi, and mention their chief legislative enactments.

8. Give a detailed account of the Catilinarian conspiracy.

9. Write a life of Cicero.

Sentences.

(Readers can have their solutions corrected on enclosing seven stamps.)

1. If you had asked your father what would have happened (*evenio*), he would have refused to tell you.

2. I should not have praised you if you had been persuaded to go to Capua.

3. It is said that your brother stopped in Rome from March 7 to March 15.

4. There can be no doubt that he was left heir to half his father's property.

5. There can be no doubt that he would have spared these men if he had been allowed (*licet*) to do so.

6. On learning that the city had been plundered by the Gauls, he made up his mind to abandon his allies and join the enemy.
7. If we were able to do so, we should have no hesitation in telling him that his son has borrowed £100 at 4 per cent.
8. It is certain that your son is not in Delos. It is uncertain, however, whether he is in Corinth or Athens.
9. On September 20, 57 B.C., this gallant hero died, and was buried shortly afterwards at Naples with great pomp.
10. On New-Year's Day we left the city of Carthage, and marched twenty miles without stopping.

ENGLISH.

Course for May.

1. History.—Cromwell to 1700. Revise first half of the History.
2. Grammar.—Nesfield, pages 301–309; pages 369–423.
3. Literature.—Finish Stopford Brooke's *Primer*, and revise first half.

MATHEMATICS.

GEOMETRY COURSE.

Revise Books II., III., and IV.

Solutions to last month's riders:—

1. Using the figure to I. 47 in Hall and Stevens, let AL cut BC in R.
Then square on AB = fig. AF = fig. BL, as proved in I. 47.
∴ squares on AB and BC together = figs. BL and BE.
Also square on AC = fig. AK = fig. RE.
∴ squares on AB and BC are together greater than square on AC by twice the fig. BL—that is, two rect. CB, BR.

2. Let x = vertical angle of the isosceles triangle in IV. 10.
Then each of base angles = $2x$.
∴ sum of all the angles = $x + 2x + 2x = 5x$.
∴ $5x$ = two rt. angles.
∴ $x = \frac{2}{5}$ of a rt. angle = 36°.

3. Inscribe in the circle an equilateral triangle ABC; bisect the arcs BC, CA, AB in P, Q, R respectively. Then it is easy to prove that AQCPBR is a regular hexagon.

Riders for May:—

1. Given base, vertical angle, and the point where the bisector of the vertical angle cuts the base, construct the triangle.
2. Prove that a triangle with given base and vertical angle is of greatest area when it is isosceles.
3. If a square and a rectangle have the same area, the diagonal of the square is less than that of the rectangle.
4. DB is a straight line perpendicular to the diameter, PA, produced of a circle, PEA; E is any point on the circumference, and PE produced meets DB in D. Prove rectangle PE, PD is constant for all positions of E.

The student should be familiar with such useful riders as the following:—

1. The diagonals of a parallelogram bisect each other, and its converse.
2. The straight line joining the middle points of two sides of a triangle is parallel to the third side, and is equal to half its length.
3. If D be the middle point of the base, BC, of a triangle, ABC, then $BA^2 + AC^2 = 2AD^2 + 2BD^2$.
4. The converse of such propositions as III. 21, 22.

ARITHMETIC COURSE.

A revision of the previous work, and miscellaneous examples, say, taken from old papers.

Illustrative examples:—

1. To express $\cdot 6\dot{3}\dot{2}$ as a vulgar fraction.
1000 times $\cdot 6323\dot{2}\dot{3}\dot{2} = 632{\cdot}32\dot{3}\dot{2}$.
10 ,, $\cdot 6323\dot{2}\dot{3}\dot{2} = 6{\cdot}32\dot{3}\dot{2}$.
Subtracting—
990 times $\cdot 6\dot{3}\dot{2} = 626$.
$$\therefore \cdot 6\dot{3}\dot{2} = \frac{626}{990}.$$

2. Find the cost of carpeting a room 18 feet square with carpet 4 feet wide, at 3s. 4d. a yard.
Here area of room = 18 × 18 square feet, and area of a piece of carpet = 4 × 3 square feet, being of length 3 feet.
$$\therefore \text{number of pieces wanted} = \frac{18 \times 18}{12}.$$
$$\therefore \text{cost} = £\frac{18 \times 18}{12} \times \frac{1}{6}, \text{ since 3s. 4d. is } \frac{1}{6} \text{ of a £.}$$
= £4, 10s.

3. Calculate to three places of decimals $\frac{1}{\sqrt{2}-1}$.
$$\frac{1}{\sqrt{2}-1} = \frac{\sqrt{2}+1}{(\sqrt{2}-1)(\sqrt{2}+1)} = \frac{\sqrt{2}+1}{2-1} = \sqrt{2}+1$$
$$= 1{\cdot}414 + 1 = 2{\cdot}414.$$

Examples:—

1. Calculate to three decimal places $\frac{1}{\sqrt{7}}$ and $\frac{1}{\sqrt{10}-3}$.
2. A man mixes 3 lbs. of tea at 2s. per lb. with 4 lbs. at 3s. per lb. At what price per lb. must he sell the mixture so as to gain 5 per cent. on his outlay?
3. What is banker's discount on £200, due two years hence, at 5 per cent.?
4. The actual cost of an article is 56 per cent. of the price at which it is marked for sale; it is sold at a trade discount of $12\frac{1}{2}$ per cent. How much does the seller gain per cent.?

Answers to last month's questions:—

1. $\sqrt{2} = 1{\cdot}41421$.
2. $\frac{1}{\sqrt{2}} = {\cdot}70710$.
3. $\frac{1}{\sqrt{3}-\sqrt{2}} = \sqrt{3} + \sqrt{2} = 3{\cdot}1462$.
4. In 1 hour the two clocks are 15 minutes different in time, one being 5 minutes fast and the other 10 minutes slow.
∴ they will be 1 hour apart in 4 hours.
∴ they will be 12 hours apart in 48 hours.
That is, they will show the same time every 48 hours, or 2 days.

ALGEBRA COURSE.

Chaps. xxxiii. and xxxiv., on the progressions, from Hall and Knight, together with working of miscellaneous examples, say, commencing at No. 50 of the set of miscellaneous examples found in the end of Hall and Knight.

Solutions to last month's examples:—

1. $a^2(b-c) + b^2(c-a) + c^2(a-b) = -(a-b)(b-c)(c-a)$.
2. This may be done either by actual division or by factors:
$$1 + a^3 + 8b^3 - 8ab = 1^3 + a^3 + (2b)^3 - 8ab \quad \ldots\ldots (1)$$
$$= (1+a+2b)(1+a^2+4b^2-a-2b-2ab),$$
yielding the quotient $1 + a^2 + 4b^2 - a - 2b - 2ab$.
For the solution by ordinary division, see Hall and Knight, Example (2), Art. 53.
3. $2x^2 + 5xy + 2y^2 + x - y - 1$
$= 2x^2 + x(5y+1) + 2y^2 - y - 1$
$= 2x^2 + x(5y+1) + (2y+1)(y-1)$
$= (2x + y - 1)(x + 2y + 1)$ by trial.

Examples:—

1. Prove $(x-3a)^3 + (2x+5a)^3 - (3x-2a)^3 = -3(x-3a)(2x+5a)(3x+2a)$.
2. Factorise $1 + y(1+x)^2(1+xy)$.
3. A person saves each year £10 more than he did the preceding one, and he saves £20 the first year. How many years will it take for his savings to reach £10,000?
4. Sum the series $100^2 - 99^2 + 98^2 - 97^2 + \ldots + 2^2 - 1^2$.
5. Sum to infinity $1 - \cdot 1 + \cdot 01 - \cdot 001 + \ldots$

GENERAL ELEMENTARY SCIENCE.

Chap. xix. to the end, and a general revision of the subject.

Get up something about hard and soft waters; also the relations between salts, acids, and bases.

THE STAFF NOTATION IN SCHOOLS.

RECENTLY Mr. Curwen gave an address to teachers, in the Board-room of the School Board for London, on the "Relation of Tonic Sol-fa to the Staff." Mr. Fuller Maitland, musical critic of *The Times*, presided. Mr. Curwen referred to his studies of school music in various European countries and in America, and found the sight-singing results everywhere were poor compared with those in the schools of the United Kingdom. He showed what were the great advantages of tonic sol-fa, and how that system helped in learning the staff. Letters read from the music superintendents of Leeds and Bradford (Messrs. Godson and Docksey) explained how the staff had been gradually introduced in their schools to Standards V. and upwards, and the ease with which the change to the staff was accomplished removed the teachers' objections. Mr. Curwen advocated no change in the Code, and no compulsion or inspection, but desired to see teachers voluntarily giving this instruction to the older children. Mr. Fuller Maitland said he had no idea that the real spirit of the staff notation could be so well and directly explained. Why should not the two systems exist side by side? Mr. Curwen had shown how the learning of music could be made a pleasure.

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head-Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of "Scholarship School Management."

SPRING EXAMINATION, 1900.

Second Month—May.

SINCE the last portion of the work was written the new Code has been issued, and necessitates an entire change of work. Schedule V.* must be carefully studied by all pupil teachers. The changes are on the whole good, and are evidently made with the object of causing young teachers to read more widely. There is more work to be done, but it is of a more pleasant kind.

The chief alteration to notice is the change in the number of the years of apprenticeship: the Syllabus is now arranged for Candidates, First Year, and Second Year, the Third Year Examination being the Queen's Scholarship. Those who have just taken the papers as candidates for pupil teachership will take the Candidates' Course, First Years will again be First Years, and Second Years, Second Years. The other changes will be noted under the various subjects.

1. READING AND RECITATION.

The special books for preparation are:—

Candidates—Scott's *The Talisman.*
First Year—Southey's *Life of Nelson.*
Second Year—Macaulay's *Essay on Frederick the Great* and Bacon's *New Atlantis.*

The best editions will be given next month.

In Recitation, Candidates have to learn 70 lines, First Year 80, and Second Year 100. The lines must be taken from the special books prescribed for study in English.

Ten or twelve lines per week of the Recitation should be learned. In *Marmion*, the Candidate would do well to learn from line 735 to line 870; in *The Traveller*, First Year pupil teachers might start at line 50; in *Julius Cæsar*, Act i., Scene 2, commencing, "Will you go see the order of the course," to "Have struck but thus much show of fire from Brutus," *or* Mark Antony's Oration, Act iii., Scene 2, *or* Act iv., Scene 3, the first 120 lines. In addition to the particular lines prepared for the examination, any passage of special note should be committed to memory.

2. ENGLISH.

New Syllabus.

Candidates—Analysis of easy sentences, and parsing.
Knowledge of the ordinary terminations of English words.
A short theme or essay.

First Year—Parsing, construction, and analysis of sentences.
First elements of etymology.
An explanation of the meaning of a short passage from the prescribed poem, *or*
A short essay.

Second Year—Parsing, construction, and analysis of more difficult sentences.
Elementary history of the English language.
Common errors in language, written and spoken.
An explanation of a short passage from the prescribed poem, *or*
A short essay.

It will be noticed that essay-writing is included in each year's work, as an alternative to paraphrasing in First and Second. This will require considerable practice (see note below). First Year pupil teachers have also to do some etymology, and Second Years, the elementary history of the language. A book will shortly be issued, from the office of this paper, covering all that is required for the three years in derivation, etc.

Work for the Month.

Candidates.—Marmion, Canto vi., lines 1–130. (Nelson's *Royal English Classics*, 4d.) Read up the summary of the preceding cantos given, or preferably read the whole of the poem. To obtain an intelligent grasp of this canto this is absolutely necessary; it is of little use to study scraps of literature, and the interest attached to this poem renders it a pleasure rather than a task. It is to a large extent impossible to understand the final canto unless the previous history of the characters is known.

Notes on Parsing and Analysis.

Line 1. The first 10 lines and half of line 11 are mainly Adverbial Sentences to lines 11 and 12.
6. *From afar.* May be taken as an Adverbial Phrase.
7. *That back, etc.* Noun Sentence in apposition with *hopes.*
9. *Where....battle day.* Adjectival Sentence to *Terouenne.*
13. *For.* Illative Conjunction.
14. *to aid her sons.* Infinitive Obj. of *prayed.*
17 and 18. *All* and *life.* In apposition to the preceding lines.
19. *As.* Adverbial Conjunction *causal.*
24. Supply *were* before *the hours.*
30. *Breeze* and *spray* in apposition with *which*, line 29.
38. *Mounted*—that is, having been mounted. Participle.
41, 42, 43. Participial enlargements of *circle*, line 44.
51. *Where'er.* Adverbial Conjunction.
53. Supply *There was* at commencement of the line.
61. *list.* Used transitively here.
68. *Home.* In apposition with *fane.*
74. This line is in apposition with the Impersonal Pronoun *it* in preceding line.
77. *Whose borders, round* = round whose borders.
85. *book.* In apposition with *that* in line 83.
89, 90, 91. In apposition with *it* in line 88.
103. *Perchance.* Adverb of Doubt, modifying *does repair.*
104. Read "*to* her peaceful rule."
108 and 109. Adverbial Sentences of Degree, mod. *such.*
110. *Form.* In apposition with *vision.*
118. *Them to glow.* Object of *taught.*
126–130. Object of *to learn.*

Notes on Meanings.

28. *Insult*—that is, attack, cognate with assault, sally, etc.
32. *Gothic*—that is, in Gothic style of architecture.
34–35. *Field-chief.* In heraldry the face of a shield is called the *field*; the upper part, about one-third of the surface, is termed the *chief.*
71. *Frontlet*, a band worn across the forehead.
95. *By Mary*—that is, by the Virgin Mary; *cf.* by the rood, by George, by Jove, etc.
106–112. The meaning is that the nuns of the convent, wrought upon by continual prayer and fasting, fancied they could see what they hoped to see—the vision of Hilda the patroness of the convent. Clare supposes she was unable to see this during her stay, either because she was not devout enough, or because she was still in love with De Wilton.

First Year.—The Traveller. Many serviceable editions of this are issued. Messrs. Nelson have the work in the Royal English Classics, price 3d. Messrs. Macmillan also published a fuller study with a good introduction and useful notes. Messrs. Chambers also issue it in their English Classics, price 3d.

For this month prepare lines 1–50. Learn the meaning of all allusions and the derivations of the chief words, *or* 20 roots and meanings each week from a good list.

Notes.

General Paraphrase.

Line 1. Far away from home, without a friend, depressed in mind, and weary with my solitude, whether by the winding course of the lazy Scheldt or in the plains of Lombardy, or farther away in the rude, inhospitable land of Carinthia, or where the Campagna stretches in all directions a nearly uninhabited waste, in whatever country, and amidst all the varied surroundings of my temporary place of rest, my thoughts, my dear brother, have ever been with you, and every step taken away from you has been but another link in the chain which has always bound me to you.

Line 11. May every blessing which Heaven can bestow be poured on him who was my earliest friend, and may his home be guarded by attendant angels. The happy spot deserves such blessings, for it is the seat of the truest hospitality. After the toil of the day is done, guests there collect round the cheerful fire—not only the well-known neighbour, but any vagrant who is in want and distress. After the hearty meal, characterised with abundance rather than luxury, the whole party sit round the fire, to laugh at the jokes and tricks that are ever welcome, to sigh at the recital of some tale of woe, to endeavour to make the shy stranger feel at ease, and to experience the highest form of human happiness—that is, the power and pleasure of doing good to others.

Line 23. Far different is my lot, cut off from such homely delights. My early manhood has been spent in continual roving and want; I have been impelled by fate to follow something to which I never attain, which, like the horizon, is always as far off as ever; and the happiness of a home is everywhere denied me

Line 31. As I now sit on the slope of some Alp, to pass an hour in thought, I look down, and in fancy behold the various countries of Europe spread out before me—lakes, forests, cities, extensive plains, the splendid palaces of the rich, and the humble cottages of the poor.

Line 37. And as I ponder, the thought forces itself upon me, Why should I grumble and grieve in the midst of this profusion of beauties provided by a beneficent Creator? Should I, because I have received a superior education, despise those simple things which constitute the pleasure of the greater part of the population of each country? No. This truth is borne in upon me with irresistible force: no matter how the educated man prides himself upon his knowledge, and affects to despise the simple pleasures of the ignorant, these humble delights are of great importance, and it would be a wiser course to pursue to sympathise with all and rejoice in all the happiness they experience.

And so I may consider all the beauties I see around me designed for my pleasure and comfort: the towns full of wealth and splendour, the waving crops ripening for the harvest, the lakes dotted with the white sails of the boats, the very workmen labouring in the fields—all form a picture designed for my interest and joy.

Notes on Parsing and Analysis.

Line 1. The words in this line are enlargements of *I* in line 7
2–6. The lines modify *roam* in line 7.
6. *Waste.* In apposition with *plain.*
7. *To see whatever realms.* Extension of *roam.*

11. *Crown.* Imperative Mood.
12. *attend.* Imperative Mood.
13. *Be.* Imperative Mood.
where....fire. Adjectival Sentence to *spot.*
15. *Where want and pain repair and where every....chair* } Adjectival to *abode.*
22. *doing.* Gerund, gov. by *of.*
Good. Abs. Noun, Obj. Case, gov. by *doing.*
23. *me.* Obj. Case, gov. by *leads* (line 29).
24. *prime.* Abs. Noun, Nom. Absolute Case.
25. *Impelled....good.* Enlargement of *me* in line 23.
27. *like.* Adj., qual. *that*, and gov. *circle* in the Obj. Case.
31. *Even.* Adv. of Emphasis, mod. *now.*
32. *Me.* Reflexive Pronoun.
33. *on high.* Adverbial Phrase.
35 and 36. The nouns in these lines are in apposition with *realms.*
40. *Vain.* Adjectival complement of the Predicate; *not* an Adverb.
41. *Let.* Principal verb, having for object, *School-taught pride to dissemble all.*
43. Read *He is wiser.*
45. *Towns, fields, lakes, swains.* Nominatives of Address.
46. *where....round.* Adjectival Sentence to *fields.*
50. *Creation's heir.* Nominative Absolute. Is equal to "because I am creation's heir," or "being creation's heir."

Second Year.—Julius Cæsar. There are many editions of this work. Nelson's edition at 4d. is very compact. Nearly every publisher has a more or less fully annotated edition. Moffat's at 1s. 6d. is very good.

For this month prepare Act i., Scenes 1, 2, to line 214, concluding, "And tell me truly what thou thinkst of him."

Notes.—N.B. Owing to the length of the play, it will be quite impossible to paraphrase the whole of it, or to give very lengthy notes on parsing and analysis. Passages presenting special difficulty in meaning will be explained, and students following this course must write for assistance in cases of difficulty not dealt with.

A notebook must be kept, and into it entered explanations of all allusions, explanations of phrases, a list of words used differently from modern meaning, derivations of chief words, etc.

Act i., Scene 1.

Line 3. *Mechanical*—that is, a mechanic or labouring man.
4. *labouring day.* There was no weekly holiday in Rome, but a number of feasts which were kept as general holidays.
10. *In respect of*—that is, comparing me with.
14. Note the play on the words *sole* and *soul.*
15. *Naughty*—that is, a thing of naught or nothing. Not the same meaning as now.
22. Note play on *awl* and *all.*
27. *Neat's leather*—that is, leather made from bullock's hide.
32. A triumph was a military procession through the streets of Rome to the Temple of Jupiter granted only to distinguished generals. This particular instance was when Cæsar was returning from his victory over the sons of Pompeius.
45. "Have you not raised such a shout that the reverberation of the sound from the banks of the river has even startled it?"
65. "Pull off the garlands and decorations from the statues of Cæsar."
71. *Vulgar.* Lat. *vulgus*, the common people.
73–76. In these lines Cæsar is compared to a bird of prey. Owing to his feathers (that is, his honours) increasing, he is likely to soar above every one else. By taking his honours away, his ambition may be kept from increasing to an undue extent.

Scene 2.

Lines 1, etc. It was a common belief that a barren woman, if touched by one of the priests who ran through the streets in the Lupercalia, would be cured of her barrenness.

Line 37. "I hope you will not misconstrue my actions, Cassius. If I have not looked as pleasant as I should, it is because I have been worried lately with ideas that concern myself alone. This, perhaps, has made me less observant of those civilities which I should extend to my friends, of whom, Cassius, you are one of the first; but I sincerely hope that they will not ascribe my negligence to any other reason than my private uneasiness."

Line 71. "I hope you will not doubt my sincerity in this matter. If I were an empty-headed talker, or if I professed the warmest friendship with every newcomer, if I solicited the friendship of a man in a mean manner in order to talk scandal about him afterwards, or if I were in the habit of taking too much wine at dinner and blabbing out all secrets, you might reasonably be suspicious of me."

Line 135. "Cæsar has grown so great that he dominates the whole world; the rest of us allow ourselves to be dwarfed in comparison, and our chief desire seems to be to find some dishonourable way of leaving this life. Every man can command his fate and future if he chooses the right opportunity; and if we become slaves, it is our own fault and not that of any outside circumstance."

Line 171. "Till we can resume our conversation, you may take this from me, that I would gladly forfeit my position as a Roman noble and become a country labourer, rather than retain it under such a form of government as seems to be imminent."

This dialogue requires careful study. It is one of the finest scenes in all Shakespeare's works. The way in which Cassius leads up to his subject, the various passions he appeals to—patriotism, jealousy, historic fame, the pride of family—are all depicted in an inimitable manner.

Line 200. A particularly good analysis of Cæsius' character, which is borne out completely throughout the drama.

Verbal explanation and notes will be found in any good text-book, and this must be consulted. The student should, however, endeavour to find out the beauties and strength of the various scenes rather than look up hair-splitting notes and quibblings. Appreciation must be aimed at, *not* criticism.

History of the Language and Errors in Speech will be dealt with later in the course.

Essay Writing.

To ask a pupil teacher to write an essay on any given subject is a good means of testing amount of reading, composition, and general literary ability. An essay is a safe criterion of ability in these respects.

There is no royal road to success, no simple rules to be learned, no formula by which it can be done. In this as in most other things, practice makes perfect; and it is only by steady and thoughtful reading on the one hand, and continual attempts on the other, that anything like distinction can be attained. Endless directions might be given, but they are more burdensome than useful. If any text book is obtained, let it be Meiklejohn's *Art of Writing English* (A. M. Holden). The companion book, *One Hundred Essays in Outline*, will also be found useful.

The two chief points necessary to produce a good essay are: (1) an abundant knowledge of the subject, to be obtained only by reading; and (2) the ability to arrange the knowledge into coherent and logical form, and to express it in good English. In other words, *read*, *classify*, and *write*.

An essay must be written each week. Select from the following, and send up an essay occasionally for criticism:—

1. Spring; 2. Flowers; 3. Domestic Animals; 4. A Country Walk; 5. An Old Farmhouse; 6. Your Native Town.

3. History.

New Syllabus.

Candidates.—General outlines of English history.

First Year.—King Alfred to Queen Elizabeth (inclusive), with special knowledge of the Norman Conquest.

Second Year.—History from 1603–1870, with special knowledge of the Civil War and Protectorate.

Work for the month:—

Candidates.—The scope required will probably not be more than that covered by ordinary history readers, and in fact it will be a mistake for candidates to attempt too much. What is required is a clear idea of English history as a whole, the gradual development of institutions, the chief landmarks, and the leading events.

Prepare From the Roman Invasion to the Norman Conquest.

First Year.—Prepare Alfred to 1066.

Chief Points.—The defeat and settlement of the Danes. Treaty of Wedmore. Alfred's reforms: Army, Navy, Finance, Law, Education, etc. Dunstan, the first of a series of Great Churchmen, and the events connected with his life.

The Third Danish Invasion. The Danish kings.

Edward the Confessor—his connection with Normandy. The way in which his reign assisted or caused the Norman invasion.

Harold and the Godwins.

Saxon life and institutions.

Second Year.—James the First.

Chief Points.—The descent of the Stuarts, including Arabella Stuart—their right to the throne.

The various plots—Main, Bye, and Gunpowder.

The Millenary Petition and the Hampton Court Conference. The Authorised Version of the Bible.

The growth of the Puritans as a religious and political party.

The Stuart theory of Divine Right of Kings—Passive Obedience—Dispensing Power.

James's Favourites.

4. Geography.

New Syllabus.

Candidates.—Chief physical features of the globe. The British Isles.

First Year.—Europe and Asia, with special reference to France, Germany, and the Indian Empire.

Second Year.—Africa, America, and Australasia, with special reference to the chief British colonies and dependencies and the United States.

Work for the month:—

Candidates.—Chief physical features of the globe.

This, I take it, means a knowledge of the position of the continents, chief oceans and seas, the countries comprising the various continents and their capitals, with a few of the leading ports.

First Year.—This, being a repetition of last year's work, will be somewhat easy, and allow of more time being devoted to arithmetic, which will need it.

Prepare Europe generally—position, extent, physical features, climate, productions, and peoples.

Second Year.—Africa generally (see notes last month), and the northern states: Morocco, Algeria, Tunis, Tripoli, and Egypt.

In each case draw a map, and insert all places to be learned, and those only. Note productions, industries, and chief towns.

The reason of the British occupation of Egypt should be carefully noted, and also its results.

5. Arithmetic.

New Syllabus.

Candidates.—Arithmetic, including vulgar and decimal fractions, simple proportion, and practice.

First Year.—The preceding, with proportion and its application to simple interest and percentages. The principles of the metric system.

Third Year.—Arithmetic generally, including measurement of rectangular areas and solids.

(*N.B.*—It will be noticed the syllabus is the same for boys and girls. This is different from previous Codes, and girl pupil teachers in their first and second years (new style) will have to work hard at this subject.)

Work to be prepared:—

Candidates.—Simple practice, with theory of aliquot parts.

First Year.—Vulgar fractions. Theory and definitions of various kinds. Addition, subtraction, multiplication, division, complex and compound.

Second Year.—Simple proportion. Read up the theory of ratio *very* carefully. Be prepared to state and work all sums by method of ratio or method of unity.

6. Euclid and Algebra (Boys).

New Syllabus.

First Year.—Book I. to Prop. 26, with deductions.

First four rules of algebra and easy equations and problems.

Second Year.—Book I., with deductions.

Algebra—G.C.M., L.C.M., fractions, equations of two unknowns, and easy problems.

Work for the month:—

First Year.—Euclid—definitions, axioms, and postulates.

Algebra—meaning of terms in algebra, substitution of numerical values.

Second Year.—Euclid—Props. 26–30, and four deductions per week.

Algebra—G.C.M.

7. Music (Syllabus as before).

Candidates.—Common major scale—its structure and intervals.

First Year.—First removes of key.

Second Year.—The minor scale—its structure and relation to the major.

8. Teaching.

New Syllabus.

Candidates.—To set copies on the blackboard.

To correct dictation exercises, sums, and copies.

First Year.—The preceding. To question a class.

Second Year.—The preceding. Notes of lesson. To give a lesson on a subject taught by the pupil teacher during the year, or to give a lesson to an infant class.

N.B.—It will be observed that the theoretical part of the subject and the written examination thereon disappear. The practical part is limited to defined subjects, the most important of which is copy-setting on a blackboard. As pupil teachers cannot write well on a blackboard unless they can write well on paper, it will be necessary to take steady practice at penmanship. Use *The Practical Teacher Copy-book.*

9. Elementary Science.

This is, as before, optional, and the syllabus is the same as last year. As this affords a steady preparation for the paper at the Queen's Scholarship, all pupil teachers should attempt it. Cartwright's *Section I. Physiography* (T. Nelson and Sons) covers the whole of the course.

No test questions will be set this month, but pupil teachers should paraphrase and analyse the English set, and parse all words presenting difficulty. Specimens of work are criticised gratis. It will probably be in the essay-writing that most assistance will be needed.

AUTUMN EXAMINATION, 1899.

Eighth Month—May.

Work to be Prepared.

A.—English.

First Year.—Ode on Spring, verses 3 and 4.

Second Year.—Prepare fully lines 287–340 of *The Deserted Village.*

Third Year.—1. Learn twenty roots and meanings each week.

2. Prepare lines 280–325 of Pope's *Essay on Man*, Epis. IV.

(For Full Notes on Paraphrasing, Parsing, and Analysis, see December Number, 1898.)

B.—Arithmetic.

First Year.

Boys.—Application of fractions to weights and measures.

Girls.—General problems and back questions.

Second and Third Years.

Boys and Girls.—General problems and test papers.

A good text-book will supply a sufficient number of exercises on the various rules. Much care must be bestowed on the method and arrangement. The following are models of a few sums showing proper arrangement:—

(*a*) Simplify

$$\frac{\frac{8}{15}\times\frac{9}{23}}{\frac{8}{17}\times\frac{7}{16}}\times\frac{\frac{4}{11}\times\frac{21}{17}}{\frac{11}{15}\times\frac{17}{19}}=\frac{\frac{184+135}{15\times23}}{\frac{128+119}{17\times16}}\times\frac{\frac{68+231}{11\times17}}{\frac{209+255}{15\times19}}=\frac{\frac{319}{15\times23}}{\frac{247}{17\times16}}\times\frac{\frac{299}{11\times17}}{\frac{464}{15\times19}}$$

$$=\frac{319}{15\times23}\times\frac{17\times16}{247}\times\frac{299}{11\times17}\times\frac{15\times19}{464}$$

$$=\frac{29\times11}{15\times23}\times\frac{17\times16}{13\times19}\times\frac{23\times13}{11\times17}\times\frac{15\times19}{29\times16}=\text{Ans. }\underline{1.}$$

(*b*) What is the least number by which 2268 must be multiplied to make a perfect square?

2268 in prime factors $= 2\times2\times3\times3\times7.$

$= 2^2\times3^2\times7.$

Hence it is evident, to make a perfect square, it will be necessary to multiply by 7. Ans. 7.

(*c*) Reduce $4\cdot32\dot{4}28571\dot{4}$ to a vulgar fraction.

$\cdot\dot{4}28571\dot{4} = \frac{4}{9}$. Therefore the fractional part is equal to $\cdot32\frac{4}{9}$, or $\frac{32\frac{4}{9}}{100}$, or $\frac{227}{400}$. Ans. $4\frac{227}{700}$.

(*d*) A number is divided by 45 in two steps, the factors being 5 and 9, and the remainders are respectively 3 and 5. What would the remainders have been if the number had been divided by 9 and then by 5?

$$45\left\{\begin{matrix}5\text{---}+3\\9\text{---}+5\end{matrix}\right\}28 \text{ full remainder.}$$

$$45\left\{\begin{matrix}9\text{---}+(?)\\5\text{---}+(?)\end{matrix}\right\}28$$

Hence it is seen that 28 must be made up of as many 9's as possible, and remaining units = 3 + 1. Hence the remainders are 1 and 3. Ans. 1 and 3.

(*e*) A bought a cycle for £10 and sold it to B at a gain of 10 %. B sold it to C at a gain of 10 %. What did C pay?

Let 100 = cost price to A.

Then 110 = price B paid.

And 110 + ($\frac{1}{10}$ of 110) or 121 = price C paid.

Then selling price of 100 = 121.

" " $1 = \frac{121}{100}$.

" " £10 = £$\frac{121\times10}{100}$ = £12·1 or £12, 2s.

C.—Geography.

Siberia, China, and Japan.—The geography of these countries is important, and especially so at the present time. The productions, industries, commerce, and government require especial attention. The Trans-Siberian Railway, the Corea, Port Arthur, Wei-hai-wei, etc., must be noted. The government of China, the rapid development of Japan into a powerful empire, and the causes of this progress should be known. Note that Japan is now a limited monarchy, this form of government having been granted by the Mikado in 1891.

D.—History.

The Commonwealth and Charles the Second. Note the spirited foreign policy of Cromwell and its effects, the Navigation Act,

the causes which led to the downfall of the Republic, the character of Charles, the Treaty of Dover, the Test Act, the Dutch Wars, the Great Plague and Fire, Titus Oates's Plot, etc. Read if you can some of *Pepys' Diary* to get an insight into the social and political life of the times. The Clarendon Code of Laws against Nonconformists should also be noted.

E.—EUCLID.

Second Year.—Props. 25 and 26, Book I., and four deductions per week.

Third Year.—Props. 15–21, Book I., and six deductions per week.

G.—ALGEBRA.

General exercises on the whole of the year's work. Look up the simple rules necessary for mensuration (given in November number).

H.—TEACHING.

Second Year.—Read up what is said in Instructions to H.M.I. on Elementary Subjects.

Third Year.—Revise chaps. iv.–vi., *Scholarship School Management.*

TEST QUESTIONS.

1. Penmanship.

Large Hand—*Euphrosyne.*
Small Hand—*An honest man's the noblest work of God.*

2. Write an essay on the Electric Telegraph.

3. Paraphrase and analyse all the English set, and parse words presenting difficulty. (Write for assistance when necessary.)

4. *First Year.*—Name the intervals :—

d–l, r–t, t$_l$–f, m–t.

Second Year.—Write the following in two-pulse measure, in the same number of measures :—

| d :– :d | d :– :– | d :d :d | d :– :d | d :d :– | d : :d ||

Third Year.—Which of the following is highest in pitch, and which is the lowest—l in Key C, m in Key B♭, s in Key G, r' in Key D?

5. Describe with a sketch map the course of the Ganges. Why does it rise in May and June?

6. Describe the Indian seasons.

7. Give some account of the government of India. What are the chief exports? Which of the latter have recently much increased?

8. Say what you can of the animal and vegetable life of India.

9. What do you know of Delhi, Benares, Cawnpore, Punjaub, Simla, Point de Galle, Agra, Goa, Lucknow, Hooghly, Deccan, Bangalore, Rangoon, Trincomali, Lahore, Calicut, Kurrachi, Singapore, Surat?

10. Recount in order, with dates, the chief incidents of the war between Charles the First and the Parliament.

11. Under what circumstances did the Scots take part in the Civil War?

12. What do you know of the Humble Petition and Advice?

13. Explain clearly how you would lead children to see the real remainder when dividing by three factors. Take, for example, division by 7, 8, and 9, with remainders 5, 4, 7.

14. Write notes of a lesson on the Pig, or on the Comparison of Adjectives.

SCHOLARSHIP COURSE FOR DECEMBER 1899.

1. *Reading.*—Ten minutes' oral practice per diem, as often as possible before a competent critic. Read at least one of Scott's novels per month.

2. *Penmanship.*—A few minutes' daily practice from copy book (*Practical Teacher Copy Book*, 1s.). Continual care with ordinary writing also needed.

3. *Repetition.*—Twelve or fifteen lines weekly till the whole is known.

4. *Composition.*—Continual care and practice needed. Read up the subject if necessary. Arrange an analysis or plan beforehand. Write one or two essays each week, selecting from the following :—

(*a*) Instinct in Animals.
(*b*) Signs of Spring.
(*c*) The British Occupation of Egypt.
(*d*) Holidays, and How to Use Them.
(*e*) Smuggling.
(*f*) Flowers.
(*g*) The difference between Poetry and Prose, and the uses of each.
(*h*) The Dignity of Labour.
(*i*) Night.

5. *English Language and Literature.*

(1.) Learn twenty roots and meanings per week.
(2.) Prepare the grammar of the adverb.
Learn a good classification, and note the comparison of adverbs.

Mems.—1. Adverbs modify the meaning of verbs, adjectives, and adverbs, *or their equivalents.* Thus we get—
Even now I sit me down. *Even* mod. "now" (emphasis).
Even as he spoke. *Even* mod. "as he spoke."
Just when our drawing-room begins to blaze, etc. *Just* mod. "when.... blaze."

2. Pronominal Adverbs.
Whereby = by which.
Wherein = in which.

3. Nouns are sometimes used Adverbially: for example—
Go *home*; it weighs a *ton*; it is a *yard* long.
Parse as nouns—Adverbial Objective Case.

4. *There* is used as an introductory Adverb when the Predicate precedes the Nominative, without any signification—for example, *There* lived a king. *There* are many who think, etc. It is sometimes called the Idiomatic Adverb.

5. In such phrases as, The more the merrier, *the* is an Adverb of Degree, meaning "by this much."

(3.) *Literature.*—Pp. 155–212, Collier's *History of English Literature.*
Chief writers :—

Bacon—*Essays, Novum Organum, New Atlantis, Advancement of Learning.*
Ben Jonson—*Every Man in His Humour, Catiline, Sejanus, Alchemist, Volpone.*
Drayton—*Polyolbion.*
Marlowe—*Tamburlane, Faustus, Jew of Malta, Edward II.*
Herrick—*Lyrics.*
Burton—*Anatomy of Melancholy.*
Hobbes—*The Leviathan.*
Walton—*Complete Angler.*
Fuller—*Worthies of England, Church History of Britain.*
Taylor—*Holy Living and Dying.*
Clarendon—*History of the Great Rebellion.*
Milton—*Ode on the Nativity, L'Allegro, Il Penseroso, Arcades, Comus, Lycidas, Paradise Lost, Paradise Regained, Samson Agonistes, Areopagitica, Eikonoklastes, Defence of the English People.*
Something should be known of each of these men and each of the works mentioned above. Bacon, Jonson, and Milton need especial study.

(4.) Prepare lines 1–270 of *Comus.* Make sure of all analysis and parsing, and write for assistance in case of difficulty.

6. *Arithmetic.*—Christian and Collar, chaps. xxxvi., xxxvii.: Percentage and Commission, Brokerage and Insurance. Work as many examples as possible from exercises 93 and 94. Study very carefully paragraphs 228, 229, 230, 231, and 232.
Send up any for solution which present difficulty.

7. *Algebra.*—Hall and Knight, chap. xxiii. (Harder Equations). Work as many of the examples as possible. Note very carefully the method of solution on p. 166 of such equations as :—

$$\frac{x+5}{x+4} - \frac{x-6}{x-7} = \frac{x-4}{x-5} - \frac{x-15}{x-16}.$$

Dividing each denominator into each numerator, we get

$$1 + \frac{1}{x+4} - 1 - \frac{1}{x-7} = 1 + \frac{1}{x-5} - 1 - \frac{1}{x-16}$$

$$= \frac{1}{x+4} - \frac{1}{x-7} = \frac{1}{x-5} - \frac{1}{x-16}$$

$$= \frac{-11}{(x+4)(x-7)} = \frac{-11}{(x-5)(x-16)}.$$

And since the fractions are equal and the numerators are equal, the denominators must be equal.

$$\therefore (x+4)(x-7) = (x-5)(x-16)$$
$$= x^2 - 3x - 28 = x^2 - 21x + 80$$
$$18x = 108$$
$$\underline{x = 6.}$$

8. *Euclid.*—Props. 37–40, Book I., with twenty deductions from Egan's *Exercises.*

9. *Geography.*

(1.) Cape Colony and Natal.
(2.) Revise Asia Minor, Persia, Arabia, Afghanistan, Beluchistan, and the Central States.
(3.) Memory maps. (Use *Methodic Memory Maps*, 1s., Office of THE PRACTICAL TEACHER.)

Data on Cape Colony.

Area, 276,947 square miles. Population, 1¾ millions.
Climate healthy, and its peculiar dryness and uniformity of temperature cause it to be much favoured by Europeans suffering from pulmonary diseases.

The principal industries are the production of wool and wine, rearing of horses, cattle, and ostriches, culture of wheat, barley, and oats; copper in Namaqualand; gold, manganese, and coal in various parts; diamonds at Kimberley.

Chief Imports—Apparel, arms, books, carriages and cycles, coal, cottons, furniture, hardware, leather, machinery, metals, paper, soap, spirits.

Exports—Copper ore, diamonds, feathers, hides, sheepskins and goatskins, wool.

Government—Responsible Government. Governor appointed by the Crown (Sir A. Milner). Legislative Council of 23 elected members, and a House of Assembly, 79 elected members.

Chief Towns—Cape Town, Grahamstown, Port Elizabeth, Kimberley, Beaconsfield.

10. *History.*—The Tudors, 1485–1603.

11. *Theory of Teaching.*—Chaps. v. and vi., *Scholarship School Management.*

12. *Spelling.*—One hundred words per week, from *Words commonly Misspelt.*

13. *Domestic Economy.*—Washing.

14. *Music.*—Chap. v., *School Music Teacher.*

15. *French.*—Next four pages of *Le Trésor.*

16. *Physiography.*—Chap. ix., Gregory.

17. *Freehand.*—One or two copies each week. Send up one occasionally for criticism.

Test Questions.

1. Penmanship.

Large Hand:—*Mount Dwalagiri.*
Small Hand:—*Sweet Echo, sweetest nymph, that liv'st unseen.*

2. Notes of Lesson on—Recurring Decimals, The Eye, Volcanoes, Extensions of the Predicate.

3. *Comus.*

(*a*) Analyse lines 153–164.
Parse *to cheat, lest, which, must be.*
(*b*) Analyse lines 170–180.
Parse *guide, methought, such as, amiss, loth to meet.*
(*c*) Analyse lines 216–226.
Parse *good, but as, officers, if need were.*
(*d*) Analyse lines 230–243.
Parse *song, canst, tell me but where, so may'st thou be.*

4. Explain clearly what is meant by subjunctive mood, and distinguish it from the conditional indicative.

5. For what reasons is Shakespeare considered the greatest dramatist? Mention any of his plays you have read.

6. Explain the plan of the *Faerie Queene.*

7. What do you know of the proposed federation of the Australian colonies? What is the general form of their governments?

8. State the chief industries, imports, and exports of New Zealand.

9. If a friend were going on a holiday to New Zealand, what parts of the islands would you advise him to visit, and for what purposes?

10. Describe a voyage from Stockholm to Hammerfest.

11. Point out what constitutional advances were made under the Lancastrians.

12. Detail the causes which led to the Wars of the Roses, and give a genealogical table showing the rival houses.

13. Enumerate some injurious practices in modern dress, and explain clearly *why* they are injurious.

CORRESPONDENCE: RULES.

To ensure an answer in the next issue, queries must be sent by the 15th of each month.

Name and address of sender, with coupon of current number of THE PRACTICAL TEACHER (and *nom de plume* if desired), must be enclosed.

As a rule, all replies will appear in the Correspondence Column; but any one desiring an immediate reply may obtain it by enclosing a stamped addressed envelope.

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to "A. T. FLUX, The Bays, Belvedere, Kent."

ANSWERS TO CORRESPONDENTS.

J. W. G.—Composition good, but lacking in vigour—50/60. Penmanship poor—30/60; destitute of style, irregular and incorrect in detail. Practise from a good model.

Heather.—Essay fairly good—40/60. Subject set is largely evaded. It is useless to write round a point. References to modern history very hazy; there is no Khalifa of Egypt.

Urania.—Essay—53/60. Rather too long; arrange in paragraphs.

Will.—Essay—50/60. Should be arranged on a definite plan, each section commencing a new paragraph. General writing poor.

Excelsior.—I do not know. Write to the Secretary, Education Department, Whitehall, S.W., and ask him.

OUR CERTIFICATE COURSE FOR 1899.

BY GEORGE COLLAR, B.A., B.SC.,
Head-Master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON THE APRIL WORK.

THEORY OF TEACHING.

FIRST YEAR.—1. Mention some of the more common mistakes made in kindergarten teaching in English schools.

2. Give examples of the fallacies known as *ignoratio elenchi* and *petitio principii.*

3. Point out the fallacies in the argument of the man staying at a seaport, who said that the tides could not be due to the sun, since they occurred at different times of the day, nor to the moon, since they did not come until the moon had crossed the meridian some hours, but must be caused by the arrival of the tidal train.

SECOND YEAR.—1. Show how the reasoning powers and memory act and react on one another.

2. Distinguish between an act of reasoning and a mere associative train of thought.

ARITHMETIC.

1. What premium should a manufacturer pay on his factory, worth £25,080, in order to recover both the value and the premium in case of destruction—insurance at 17s. 6d. per £100?

2. Seven gallons of brandy containing 35 % of alcohol are mixed with twelve gallons containing 42 %; what percentage of alcohol is there in the mixture?

3. Find the compound interest on 7,050 francs for four years, at 3 per cent., correct to the nearest centime.

MUSIC.

BOTH YEARS.—1. Give the names of the classes into which voices are usually grouped, and say what is the approximate range in each class.

2. On taking charge of a new class of children, what steps would you take to classify and arrange them for part-singing?

3. What are the advantages and disadvantages of "Rounds" as singing exercises for children?

ENGLISH.

FIRST YEAR.—From what parts of speech have our prepositions been formed? Trace the formation of conjunctions from prepositions.

BOTH YEARS.—Give an outline of the paper on Frozen Words.

SECOND YEAR.—Into what classes can you arrange Shakespeare's plays? Why is *As You Like It* called a comedy?

GEOGRAPHY.

Questions on the April work were given in last number.

HISTORY (BOTH YEARS).

1. Give an account of the Trial of the Seven Bishops. How did it mark an epoch in our judicial history?

2. Name three illegal acts of James the Second, and say in what way they were illegal.

3. Sketch the course of events from the landing of William, as Prince of Orange, to his coronation.

ALGEBRA.

WOMEN.—1. Solve the equations:—

(*a*) $\begin{cases} (a^2 - b^2)(5x + 3y) = 2ab(4a - b) \\ a^2y - \dfrac{abc}{a+b} + (a + b + c)bx = b^2y + ab(a + 2b). \end{cases}$

(*b*) $\dfrac{1}{x-a} + \dfrac{1}{x+a} = \dfrac{1}{x^2 - a^2}.$

2. Find a number composed of two digits which exceeds 7 times the sum of its digits by 3, but falls short of 8 times the sum of its digits by 7.

MEN—FIRST YEAR.—1. The area of a right-angled triangle is 240 square inches, and one of the sides which contain the right angle is 14 inches shorter than the other. What is the length of the hypotenuse?

2. Solve the equations:—

(*a*) $\dfrac{1}{x - \sqrt{2 - x^2}} - \dfrac{1}{x + \sqrt{2 - x^2}} = 1.$

(*b*) $4x^4 - 27x^2 = 40.$

(*c*) $\begin{cases} 4x + 6y + = 3 \\ 4x^2 + 9xy + 9y^2 = 11. \end{cases}$

SECOND YEAR.—1. Prove that in every geometrical progression the product of two terms equidistant from the extremes is constant, and is equal to the product of the extremes.

2. If $3^{\cdot}5 = \log_{10} a$, find a without referring to tables.

3. Prove that $\log \frac{a}{b} = \log a - \log b$.

GEOMETRY.

WOMEN.—1. If two exterior angles of a triangle are equal to one another, prove that the triangle is isosceles.

2. From two points on opposite sides of a straight line draw straight lines to meet in the given straight line and make equal angles with it.

MEN—FIRST YEAR.—1. Prove that if on each of two intersecting straight lines there be drawn segments containing angles equal to that between the given straight lines, each of the straight lines will touch the segments.

2. Show that if two equal straight lines be drawn from a point without a circle to the concave circumference, they cut off equal segments.

SECOND YEAR.—1. Show how to draw an arithmetic, geometric, and harmonic mean between two given lines.

2. Straight lines are drawn through each of the angular points of a triangle parallel to the opposite sides; prove that all the triangles thus formed are similar.

LATIN.

BOTH YEARS.—1. Explain clearly the difference between the objective and the subjective genitive.

2. Translate *In Catilinam*, chap. viii.

SECOND YEAR.—Explain the following:—

(*a*) *Ultimus ille dies bello gentique fuisset.*

(*b*) *Cui carmina semper*
Et citharae cordi numerosque intendere nervis.

(*c*) *Mens exaestuat ira.*

FRENCH.

BOTH YEARS.—1. Translate the following:—

(*a*) This lady sings well; I have heard her sing.

(*b*) This ballad is pretty; I have heard it sung.

2. Explain the difference between the two phrases:—*Ce sont des êtres* vivants *comme nous. Ce sont des êtres* vivant *comme nous.*

3. Translate into English:—

(*a*) *Il le disait à tout le monde, un peu pour soutenir gageure, un peu aussi parce qu'il croyait l'être tout de bon.*

(*b*) *Il n'en fallait pas tant pour le mettre décidément au lit.*

(*c*) *Qui pourra douter de l'influence des habits sur les voyageurs, lorsqu'on réfléchira que le pauvre comte de —— pensa plusieurs fois faire le voyage de l'autre monde pour avoir mis mal à propos sa robe de chambre dans celui-ci?*

SYLLABUS AND HINTS FOR MAY.

COMPOSITION.

Draw up schemes for essays on the following, and write one out at length:—

1. The Study of History.
2. Bank Holidays.
3. Perseverance.
4. Epic Poetry.

THEORY OF TEACHING.

FIRST YEAR.—1. General principles of education. Consider the two theories respecting the teacher's work:—Is the child a germ capable of assimilating all kinds of intellectual pabulum provided by the teacher—that is, is the teacher a sort of gardener whose duty is to prepare the soil surrounding the young plant, which grows by its own innate vitality; or is he an architect and master-builder, whose finished product is the perfectly educated man?

Nature of the work required of a teacher; qualities requisite to carry on that work.

General principles of child nature; methods of dealing with children. Incentives to work. Use and abuse of rewards and punishments. Essentials of "good discipline." Formation of good habits; special methods of developing truthfulness, punctuality, politeness, and consideration for others. The art of questioning. Rules for answering.

2. *Logic.*—Methods employed in the pursuit of knowledge. Analysis and synthesis. Induction and the inductive syllogism. Mathematical induction. Notice carefully the cases in which a general rule can be established from the study of one example. Students frequently come to grief in arithmetic by attempting to establish a general rule by treating a particular example in a particular way. See, however, the *New Arithmetic*, chaps. 17–19; and note also the general treatment of a proposition in Euclid.

Observation and experiment. Importance of discriminating between the essential facts and the attendant circumstances. Read Jevons, chaps. xxiv.–xxvii.

SECOND YEAR.—*Psychology.* Apperception—union of new idea with that which is already in the mind. Mutual reaction between the two. Importance to a teacher of a clear understanding of the conditions under which the content of a concept is extended. Object of the "introduction" to a lesson is to prepare what has already been learned for the reception of the new matter. Proceed step by step, and link thought with thought.

The feelings: teacher's work in repressing the bad and developing the good passions.

GEOGRAPHY (BOTH YEARS).

Revise geography of India and British Possessions in America. In studying trade of Indo-China, note:—

1. That nearly all the sea-borne trade is with the United Kingdom.

2. That there are three great caravan routes:—

(*a*) From Bhamo to Yunnan Fu.

(*b*) From Moulmein to Yunnan Fu.

(*c*) From Hanoi to Zimme, thence W. to Moulmein, and S. to Bangkok.

Note in connection with British Guiana that the Court of Arbitration dealing with the Boundary Dispute will, it is thought, be much helped towards a decision by the documents found at Georgetown. England will probably be able to establish her claims to the country west of the Essequibo and the Upper Cuyuni. The decision of this court is to be accepted by both sides as final.

TRADE ROUTES.—In studying the following trade routes, it is a good plan to have an outline map of the world, mark the exact position of each place mentioned, and then draw a line to indicate the general direction of the route.

Routes from England to the East.—1. From England to India (17 to 19 days), China (38 to 40 days), Japan, Australia (36 to 38 days), *viâ* Suez.

Boats leave Tilbury and proceed to Gibraltar and Naples; pass through Strait of Messina, thence to Port Said, through the Suez Canal to Suez, and on to Aden.

Here the boat goes to Colombo, either direct or *viâ* Bombay. From Colombo the journey is continued through Malacca Strait to Singapore, and thence to Hong-Kong, from which place boats proceed N. to Shanghai and other Chinese ports, NE. to Nagasaki, Yokohama, and other ports in Japan.

Boats on this route, bound for Australia, go from Aden to Albany, in Western Australia, either direct or *viâ* Colombo.

2. From England to Bombay and Australia, *viâ* the Cape.

Boats leave Southampton, call at the Canaries, St. Helena, and Cape Town. From the last named boats proceed to Bombay, calling at Port Elizabeth, Durban, Mauritius; or go due E. between parallels 38° and 40° S. latitude to Adelaide and other Australian ports.

3. From England to New Zealand, Tasmania, and Australia (43 to 45 days).

Boats leave London, proceed to Plymouth, and thence to New Zealand, calling at Teneriffe in Canaries, Cape Town, Hobart. At Hobart, passengers, etc., bound for Australian ports are transhipped into the vessels of the intercolonial companies. The homeward journey is made round Cape Horn. The boat calls at Rio de Janeiro (or Monte Video occasionally) and Teneriffe, proceeding thence to Plymouth and London.

Some of the chief lines of boats plying between England and the East are—the Peninsular and Oriental (P. and O.), Orient, Shaw, Savill and Co. The Union and Castle Lines run to South Africa.

Routes from England to Canada and United States (average, 5½ to 7 days).

1. Boats run from Liverpool to Quebec or New York, calling at Queenstown, in Cork Harbour. From this point they run W. as far as meridian 40° W., then they proceed NW. to Quebec, or SW. to New York.

2. Boats from Glasgow go round the north of Ireland and the south of Newfoundland, passing through the Gulf of St. Lawrence to Quebec.

The chief lines of steamers are—the Allan, Anchor (Glasgow and Liverpool), Beaver, Cunard, Dominion, White Star.

Routes from Canada to New Zealand and Australia.

There is a four-weekly mail service between Vancouver, Victoria (British Columbia), Honolulu, Suva, Wellington (New Zealand), and Sydney (New South Wales).

The establishment of these fast mail steamers between Canada and New Zealand and Australia is a natural outcome of the opening of the Canadian Pacific Railway. This highway between Canada and Australasia is of great importance to the British Empire, both commercially and strategically.

Route from Canada to China and Japan.—Empress Line.

The boats of the Empress Line belong to the Canadian Pacific Railway, and run, in connection with it, between Vancouver, Japan, China, and Hong-Kong.

ENGLISH HISTORY (BOTH YEARS).

To death of William the Third, 1702.

Provisions of the Bill of Rights.

Triennial Act, 1694. Distinguish from the Act of the same name passed in 1641, the principal object of which was to ensure that the country should never be *without a Parliament* more than three years. The Act of 1694 limited the duration of a Parliament to three years. It was repealed by the passing of the Septennial Act, 1716, in order to postpone the general election which was then due, and in which the supporters of the Pretender might have given George the First some trouble.

Study also the provisions of the Treason Act, 1695, and Act of Settlement, 1701.

Among political and economical developments of the reign note the evolution of party government, the foundation of the Bank of England, and the Darien Scheme.

The foreign relations present considerable difficulty to the student who is ignorant of European history; hence our readers are advised to peruse the chapters on this period in such books as Freeman's *General Sketch of European History*, and Miss Yonge's *Primer of French History*, or *The Parallel History of France and England*, by the same authoress.

The following points in the history of Louis the Fourteenth will repay careful study:—

Louis the Fourteenth came to the throne in 1643, at the age of five. The government was carried on by his mother, Anne of Austria, and the Prime Minister, Cardinal Mazarin. The latter was a pupil of Richelieu, and though in personal character unlike Richelieu, he carried out his policy with great success. During the minority, in spite of troubles at home, France was successful abroad. War was waged against Spain (1648–59), and in this contest the French army, under Condé and Turenne, defeated the Spaniards in Champagne. Cromwell at first offered to enter into an alliance with Spain, but could not obtain the terms he asked. Knowing the importance of shutting in the Spaniards along the coast of the Netherlands, Mazarin succeeded in making an alliance with Cromwell, although Cromwell's conditions were hard ones—namely, Prince Charles and the Duke of York were to be expelled from France, Dunkirk and Mardyck were to be taken from the Spaniards and given over to England. The war was brought to a close by the Treaty of the Pyrenees, which, besides extending French territory, provided for the marriage of Maria Theresa, the Infanta, with Louis the Fourteenth. According to custom, Maria Theresa should have renounced her right to succeed to the Spanish throne; but Mazarin inserted a clause that this should only be done on payment of 500,000 crowns as dowry, and as the Spanish treasury was empty, this stipulation was not fulfilled.

This treaty marked an important step in the downfall of Spain, whose influence was broken in Italy, while the Spanish Netherlands were more restricted between France on the south and Holland—now independent—on the north. Mazarin died in 1661, and internal affairs then fell under the able administration of Colbert, while the foreign policy was directed by De Lionne. The latter tried unsuccessfully to secure the recognition of the claim of Maria Theresa by Spain. He then set to work to isolate and weaken that country, with the object of securing the Spanish Netherlands in any case on the death of Philip the Fourth, and of securing also Spain itself in case of the death of the young prince Charles, brother of Maria Theresa. Opposition was likely to come from Holland and from England, as well as from the empire. To Holland there would be grave danger in the passage of Belgium from the weak hands of Spain to the powerful and ambitious rule of France. The maritime rivalry between England and Holland rendered an alliance between them almost impossible, and made it easy for De Lionne to deal with each separately. His skill and bribery were so successful in his dealings with Charles the Second, that he gave his sister Henrietta in marriage to Philip of Orleans, brother of Louis the Fourteenth, 1661, and sold Dunkirk and Mardyck to the French, 1662; and in the latter year Jean de Witt signed a treaty of commerce and defensive alliance with France. The "League of the Rhine" barred Austria from helping Spain, and Portugal was induced to forsake Spain and ally herself with England.

In the first Dutch war (1664–65) Louis did not give the aid promised in the treaty to the Dutch. Desiring to see the two maritime countries weaken each other, he kept his ships in the Mediterranean engaged in minor operations against Algiers, etc.; but on land he helped the Dutch against the Bishop of Munster, who was an ally of the English.

The death of Philip the Fourth (1665) made Louis anxious to see peace in Europe, and mainly through his influence the Treaty of Breda was drawn up.

The Flemish law allowed daughters by a first wife prior claim to real property over sons by a second wife. Declaring that this applied to government as well as property, Louis claimed Flanders and Brabant in his queen's name. The law of Franche-Comté allowed of equal division between the children, so Louis claimed one-third of this province. Owing to the weakness of Spain, his armies had only to march into these places to conquer them.

Then came the Triple Alliance (1668), to check the increasing power of France; and Louis at first gave way before it, and signed the Treaty of Aix-la-Chapelle. Soon Colbert established a duty of 25d. per ton on every foreign vessel entering a French port. In return the Dutch laid prohibitive duties on French wines and spirits, and war was soon declared. De Lionne, although opposed to the war, did his best to secure the success of France. To this end, Charles the Second was induced to sign the Treaty of Dover (1670), and Sweden was similarly bribed to desert Holland. To meet the French, the Dutch had at sea a fleet of 142 ships under De Ruyter, but on land only 25,000 soldiers, badly equipped.

Holland was invaded by Condé and Turenne, and the Dutch sued for peace; but Louis offered such preposterous terms that the Dutch not only refused them, but overthrew their government, which had been treating with Louis, massacred John and Cornelius de Witt, and named William of Orange Stadtholder. William was only twenty-two years old, but he accepted the task, and saved Holland by opening the flood-gates. He then reorganised his small army, and succeeded in forming a Grand Alliance, which included many of the German states, Denmark, Spain, and eventually England. The war lasted with varying success until the Peace of Nymwegen (1678). Holland was saved; but France increased her possessions in the north, and maintained her ascendency among the European states.

For the next ten years the history of France deals chiefly with matters of internal policy. The revocation of the Edict of Nantes (1685), withdrawing liberty of conscience from the Protestants, drove many of them out of France, and other countries gained by the influx of skilled and industrious artisans.

After 1685 the glory of the reign of Louis the Fourteenth declined. In consequence of the breach of the Treaty of Nymwegen by Louis the Fourteenth, who reimposed the tariff of 1667 on Dutch goods, William formed the League of Augsburg against France.

The succession of William to the English throne had a great effect on Continental policy. It brought the principles of constitutional monarchy into opposition with those of absolute monarchy, it ensured the co-operation of England and Holland, and gave England a preponderating influence in Western Europe.

Against the League of Augsburg Louis waged war in five places—(*a*) in Ireland and at sea (battles of Bantry Bay, Beachy Head, Drogheda, and La Hogue); (*b*) on the Rhine; (*c*) in Italy; (*d*) in Spain; (*e*) in the Netherlands. The latter was the scene of the operations of Luxembourg, who defeated the Prince of Waldeck at Fleurus, then William the Third at Steinkirk (1692), and again at Neerwinden (1693). Luxembourg died in 1695, and was succeeded by the favourite Villeroi, from whom William succeeded in capturing Namur. Catinat and Boufflers again turned the tide: the French captured Ath and the lines of the Dender, and threatened Brussels.

Though successful in arms, the French were in great financial straits, and agreed to the Peace of Ryswick (1697), by which they restored all places taken during the war.

In anticipation of the death of Charles the Second of Spain, various treaties were drawn up by the claimants. When the king actually died, Louis had to choose between accepting an extension of territory offered by the partition treaty and allowing his grandson, the Duke of Anjou, to accept the Spanish throne. In either case France would have to go to war, but in the former she could probably have reckoned on support from England. The French nobles favoured the former course, but Louis decided on the latter, and proclaimed his grandson King of Spain as Philip the Fifth, without, at the same time, precluding him from succession to the throne of France. This caused great opposition on the Continent, and Louis wantonly provoked the hostility of England by acknowledging the Pretender as James the Third. William then formed the third coalition, at The

Hague, between England, Holland, and all the German states except Bavaria.

William the Third died in 1702, but the coalition lasted under the able direction of the Dutch statesman Heinsius, Marlborough, and Prince Eugene of Savoy. The War of the Spanish Succession lasted from 1701 to 1714, and consists of three periods—(*a*) 1701–4, results indecisive; (*b*) 1704–9, brilliant victories of the allies; (*c*) 1709–14, France somewhat recovers from her defeat.

(*a*) In the first period come the capture of Liége and Huy by Marlborough, and Admiral Hopson's victory off Vigo—the result of which was to induce Portugal to join the coalition.

(*b*) The allies, determined to act merely on the defensive in Italy and the Netherlands, drew their best troops into Germany. Battle of Blenheim. The Electors of Bavaria and Cologne were involved in the defeat, and France lay open to invasion from the east. Another victory (1706), at Ramillies. Vendôme, who had obtained some success against Eugene at Cassano, was called from Italy to take command in the Netherlands; and Eugene dealt the French a crushing defeat at Turin, and drove them out of Italy. In 1704 Gibraltar was captured by Sir G. Rooke, and the French were soon afterwards driven out of Madrid. France was prevented from forming an alliance with Gustavus Adolphus of Sweden by the superior diplomacy of Marlborough. In 1708 Marlborough gained the battle of Oudenarde and took Lille.

(*c*) After the fruitless conference at The Hague, war was recommenced, and Marlborough and Eugene succeeded in defeating Villars at Malplaquet only after immense loss. Philip the Fifth proving more acceptable to the Spaniards, and the advent of the Tories to power in England leading to the downfall of the power of Marlborough, a conference met at Utrecht, and peace was signed.

Arithmetic.

Present Worth and Discount.—After working examples in interest on the determination of the principal, etc., when the other terms are given, the student will have no difficulty in discount, provided he keeps before him the fact that in true discount—

Present worth corresponds with principal.
Discount " " interest on present worth.
Face value of bill " " amount.

In banker's or commercial discount, the discount is reckoned as a percentage of the face value, and the present value is obtained by subtracting the discount from the face value. It is important to notice that when we know the discount (or present worth) of one sum for a given time at a given rate, we can find the discount (or present worth) of any other sum under the same conditions by simple proportion. The usual rule—namely, "Find the amount of £100," etc.—is merely a method of obtaining the discount on one sum.

Stocks and Shares.—There is no fresh *arithmetic* introduced into questions on stocks, but the practical meaning of the terms used must be carefully mastered. Note the different classes of questions that may be set, and the short and direct way of dealing with them.

English.

First Year.—Compound words. Study Nesfield, III., chap. xxvii., especially section 4 (Mistaken or Apparent Compounds) and section 5 (on Hybrid Compounds). The student should be fairly familiar with chaps. xxviii.–xxx., but he will find a careful study of the comparative results in chap. xxxi. amply repay him.

Comus.—(*a*) Read the whole poem through several times, so as to get the general meaning of the whole, the exact meaning of each sentence, and a sense of the poetry.

(*b*) Draw up an analysis of the poem.

(*c*) Master the allusions with the help of your notes and of a classical dictionary, and commit to memory passages that strike you on account of their beauty.

Second Year.—Sketch the characters of the Duke and his brother, Lords Amiens and Jaques, Oliver and Orlando; and commit to memory the passages that illustrate your points.

Algebra.

Women.—Problems involving equations with either one or two unknown quantities.

Revision of first four rules, factors, measures, and multiples, paying special attention to methods of proving the rules—for example, rule of signs in multiplication and division, rule for multiplying one power by another.

Men—First Year.—Problems involving quadratics, with either one or two unknowns.

Variation.—Associate this with what you have learned in ratio and proportion.

Mensuration.—Areas of miscellaneous rectilineal figures. These may always be found by dividing the figure into rectangles or triangles.

Men—Second Year.—Revise the proofs in the binomial theorem, and work miscellaneous examples. Send up any which present any difficulty.

Mensuration.—Solids bounded by planes are not mentioned in the syllabus, but no doubt they are intended to be included. They fall into two main classes—(*a*) those in which the sides are parallel, and (*b*) those in which the sides converge to a point.

The first includes parallelopipeds, cubes, and prisms; and since it is evident that slices of unit thickness cut off by planes parallel to the base are equal, we obtain the rule that "the number of cubic units in the volume is equal to the number of square units in the base multiplied by the number of linear units in the height."

The solids of the second class can be formed from those of the first by planes passing from each edge to the one opposite to it. In the case of a solid on a quadrilateral base, it is readily seen that the solid can be cut into *six* pyramids; hence the volume of the pyramid is one-sixth of that of the original solid. As it can also be shown that pyramids upon equal bases and of the same vertical height are equal, it follows that the number of cubic units in the volume of any pyramid is equal to the number of square units in the base multiplied by the number of linear units in the height.

Geometry.

Women.—Revise to the end of Prop. 26, with exercises.

Men—First Year.—Revise Book IV., paying special attention to Prop. 10, and work exercises.

Men—Second Year.—Revise to end of VI. 17, and work exercises.

Latin.

Both Years.—Study the various verb constructions.

1. Infinitive. (*a*) Substantival use, as subject or object.

(*b*) Notice the prolative infinitive after verbs of wishing, etc. It is not governed as an object by the principal verb, since the complement (when the verb is copulative) takes the same case as the subject of the principal verb—*Debeo esse benevolus.*

2. Gerunds and supines. Pay particular attention to the "gerundial attraction."

3. Uses of the imperative. Other ways of expressing command.

4. Compound sentences:—
   (*a*) Sequence of tenses.
   (*b*) Substantival clauses, including sub-oblique constructions—that is, clauses dependent on *oratio obliqua.*

Cicero, *In Catilinam.* Revise to end of the oration, and send up difficulties.

Second Year.—Revise to the end of line 449, and read these lines through at least once a week, so as to be quite familiar with them.

French.

Both Years.—Rules for the past participle. This is perhaps the most difficult part of French grammar, and requires very careful study.

Le Voyage autour de ma Chambre. Revise to the end of chap. xxv. Send up difficulties not cleared up by the notes, and read these chapters through at least once a week. Look at each sentence until it conveys a distinct meaning to your mind; then, without looking at the book, express that meaning in French.

Second Year.—Revise first two Acts of *Le Verre d'Eau*, treating it as recommended above.

THE ROYAL PORTFOLIO OF PICTURES AND DIAGRAMS.

Plant Life: Fourth, Fifth, and Sixth Series.

(T. NELSON AND SONS.)

This excellent series of pictures and diagrams is prepared in accordance with the syllabus of the Education Department (Circular 369). Each series is distinguished for the accuracy of its outline drawings, as well as for the careful selection of the most essential features in the object portrayed. The most striking characteristic is the bold, and at the same time beautiful, effect which each sheet presents when viewed as a whole. They must prove of inestimable value to the schools in which "object teaching" forms an essential part. Besides their unique value for purposes of imparting information of scientific accuracy, these charts will be valued for their artistic merit. Each sheet as it is unfolded commands the immediate and unsolicited attention of the pupil, and is at the same time a silent but potent influence in artistic and æsthetic culture. These sheets deserve the attention of every enlightened educationist, and should readily find a place on every school wall.

QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Pendennis.—Four uniform rods, each of length a, and weight W, are pivoted together so as to form a rhombus ABCD, which is suspended from one corner A. The rhombus is prevented from collapsing by a light rigid rod of length l, whose ends are fastened to the middle points of BC and CD. Find the direction and magnitude of the stress at the point A. (B.Sc. Lond. 1895.)

The point A is in equilibrium under the action of three forces—namely, a vertical force of magnitude 4W, acting vertically upwards; a force (so-called "stress") in the rod AB, acting from A to B; and a "stress" in AD, acting from A to D, and from symmetry equal in magnitude to the "stress" in AB. Let P be the magnitude of this "stress."

Resolving vertically, we get

$$\text{or,} \qquad \begin{aligned} \text{P cos BAC} + \text{P cos DAC} &= 4\text{W}, \\ 2\text{P cos BAC} &= 4\text{W}. \end{aligned}$$

If E be the middle point of AC, then BEA is a right angle, and BE $= l$, so that $\cos \text{BAC} = \dfrac{\text{AE}}{\text{AB}} = \dfrac{\sqrt{a^2 - l^2}}{a}$.

$$\text{Hence } 2\text{P}\,\frac{\sqrt{a^2 - l^2}}{a} = 4\text{W}, \ \therefore \ \text{P} = \frac{2a\text{W}}{\sqrt{a^2 - l^2}}.$$

Jack.—A is a point on the circumference of a circle, and two chords are drawn from A on the same side of the diameter through A, so as to contain a given angle θ; if one chord is twice as long as the other, find the lengths of the chords, and show that θ must be less than 60°. (Third Stage Math., 1898.)

Draw a figure, and let AB be the diameter through A; AC the longer chord, AD the shorter one. Let the length of AB $= d$, AC $= 2a$, and AD $= a$. We want to find a in terms of d and θ.

Now θ = BAD − CAD,

$\therefore \cos\theta = \cos \text{BAD} \cos \text{CAD} + \sin \text{BAD} \sin \text{CAD}$, or

$$\cos\theta = \frac{a}{d}\cdot\frac{2a}{d} + \left[\sqrt{1 - \left(\frac{a}{d}\right)}\right]\cdot\left[\sqrt{1 - \left(\frac{2a}{d}\right)}\right] \quad \ldots \quad (1).$$

Simplifying, we get

$$a^2d^2(5 - 4\cos\theta) = d^4(1 - \cos^2\theta),$$

$$\text{or } a = \frac{d\sin\theta}{\sqrt{5 - 4\cos\theta}}. \quad \text{Ans.}$$

Now AC cannot be greater than AB, nor less than zero—that is, $\dfrac{2a}{d}$ lies between the limits 1 and 0; therefore, from equation (1), $\cos\theta$ lies between the limits $\dfrac{1}{2}$ and 1—that is, θ lies between 0° and 60°.

Bards.—In the case of a continued fraction, prove that the difference between any two successive convergents is a fraction whose numerator is unity, and whose denominator is the product of the denominators of the convergents.

If $\dfrac{p_1}{q_1}$, $\dfrac{p_2}{q_2}$, $\dfrac{p_3}{q_3}$, etc., be successive convergents to a continued fraction greater than unity, prove that

$$p_nq_{n-1} - p_{n-1}q_n = (-1)^n.$$

(Lancs. County Council Schol. Exam.)

You will find a clear and concise proof of the second part of your query in Hall and Knight's *Higher Algebra*, chap. xxv.

Assuming the second part proved, let $\dfrac{p_{n-1}}{q_{n-1}}$ and $\dfrac{p_n}{q_n}$ be the $(n-1)$th and the nth convergent respectively.

Their difference is

$$\frac{p_n}{q_n} - \frac{p_{n-1}}{q_{n-1}} = \frac{p_nq_{n-1} - p_{n-1}q_n}{q_nq_{n-1}} = \frac{(-1)^n}{q_nq_{n-1}} = \frac{\text{unity (positive or negative)}}{\text{product of denominators}}.$$

A. R. Witts.—Find the co-ordinates of the limiting position, when $a^1 = a$, $b^1 = b$ of the intersection of the straight lines

$$\frac{x}{a} + \frac{y}{b} = 1, \ \frac{x}{a^1} + \frac{y}{b^1} = 1, \text{ where } a^n + b^n = a^{1n} + b^{1n} = 2c^n.$$

Find the co-ordinates of the point on the locus of the limiting position of the intersection, which is at a maximum distance from the origin, and prove that the maximum distance is $\dfrac{c}{\sqrt{2}}$.

(Indian Civil Service, 1892.)

Since there are an infinite number of limiting positions of the intersection of the two straight lines, the first part of this problem must mean: "Find the locus of the limiting position," etc.

You must first satisfy yourself that this is identically the same problem as: "Find the envelope of the straight line

$$\frac{x}{a} + \frac{y}{b} = 1,$$

having given that a and b vary according to the relation

$$a^n + b^n = 2c^n."$$

Using the method of *undetermined multipliers*,

$$\frac{x}{a} + \frac{y}{b} = 1 \quad \ldots \quad (1).$$

$$a^n + b^n = 2c^n \quad \ldots \quad (2).$$

From (1), $\dfrac{x}{a^2}\delta a + \dfrac{y}{b^2}\delta b = 0.$

From (2), $a^{n-1}\delta a + b^{n-1}\delta b = 0.$

Let $$\frac{x}{a^2} = \lambda a^{n-1} \quad \ldots \quad (3),$$

and $$\frac{y}{b^2} = \lambda b^{n-1} \quad \ldots \quad (4).$$

Eliminating a, b, and λ from equations (1), (2), (3), and (4), we get as the equation of the envelope,

$$x^{\frac{n}{n+1}} + y^{\frac{n}{n+1}} = 2^{\frac{1}{n+1}}c^{\frac{n}{n+1}} \quad \ldots \quad (5).$$

Remember that this equation represents the locus of the limiting position of the intersection of the given lines, subject to the given conditions.

Let O be the origin, and OB any straight line intersecting the curve in B. The general equation to OB is

$$y = mx \quad \ldots \quad (6).$$

Solving (5) and (6) simultaneously, we find the co-ordinates (x^1, y^1) of the point where (6) intersects (5) to be

$$x^1 = 2^{\frac{1}{n}}c\left(\frac{1}{1 + m^{\frac{n}{n+1}}}\right)^{\frac{n+1}{n}},$$

and $$y^1 = 2^{\frac{1}{n}}c\left(\frac{m^{\frac{n}{n+1}}}{1 + m^{\frac{n}{n+1}}}\right)^{\frac{n+1}{n}}.$$

Now $$\text{OB}^2 = (x^{1^2} + y^{1^2})$$

$$= 2^{\frac{2}{n}}c^2\left[\frac{1 + m^2}{\left(1 + m^{\frac{n}{n+1}}\right)^{\frac{2(n+1)}{n}}}\right].$$

You will find by the ordinary method that this is a *maximum* when $m = 1$. Hence the co-ordinates of B, when OB is a maximum, are

$$x^1 = 2^{\frac{1}{n}}c\left(\frac{1}{1+1}\right)^{\frac{n+1}{n}} = \frac{c}{2},$$

and $$y^1 = \frac{c}{2}.$$

The maximum value of OB is therefore

$$\sqrt{x^{1^2} + y^{1^2}} = \frac{c}{\sqrt{2}}. \quad \text{Ans.}$$

S. U. Sharpe.—A stock at par paying 6 % being in default, pays no interest for four years, and is then turned into stocks of different kinds—an amount of A stock guaranteed to pay 4 %, valued at par, equal to one-half the original stock; an amount of B stock paying 5 %, valued at 80 % of its nominal value, which is equal to three-quarters of the original stock; and an amount of C stock paying 1 %. What fraction must the amount of C stock be of the original stock, and at what price valued, if the annual

income be the same, and the estimated value be increased by the amount of the arrears of interest?

(College of Preceptors, Midsummer, 1898.)

Let £x be the amount of original stock. The annual income derived from this was £$\frac{4}{100}x$.

The amount of A stock is £$\frac{1}{2}x$, and the annual income from this is £$\frac{4}{100}(\frac{1}{2}x)$.

The amount of B stock is £$\frac{3}{4}x$, and the annual income derived from this is £$\frac{4}{100}(\frac{3}{4}x)$.

Let p be the fraction required.

Then the amount of C stock is £px, and the income from this is £$\frac{4}{100}(px)$.

Now the total income from A, B, and C stocks is the same as the original income. Hence,

$$\frac{4}{100}\frac{1}{2}x + \frac{5}{100}\frac{3}{4}x + \frac{1}{100}px = \frac{6}{100}x.$$

Dividing throughout by $\frac{x}{100}$, we get

$$2 + \frac{15}{4} + p = 6.$$

$$\therefore p = \frac{1}{4}. \quad \text{Ans.}$$

The £$\frac{x}{2}$ of A stock is valued at par; its real value is therefore $\frac{x}{2}$.

Similarly the real value of the £$\frac{3x}{4}$ of B stock is $\frac{80}{100}\left(\frac{3x}{4}\right)$.

Let the £$\frac{1}{4}x$ of C stock be valued at v % of its nominal value; its real value is $\frac{v}{100}\left(\frac{x}{4}\right)$.

The total real value of A, B, and C stocks has to be equal to the real value of the original stock, *plus* the amount of the arrears of interest. Hence,

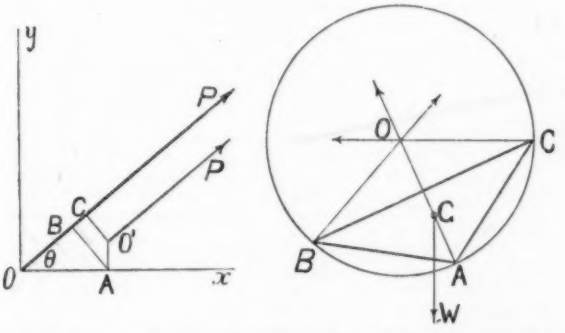
$$\frac{x}{2} + \frac{80}{100}\frac{3x}{4} + \frac{v}{100}\frac{x}{4} = x + \left(4 \times \frac{6x}{100}\right).$$

Multiplying throughout by $\frac{400}{x}$, we get

$$200 + 240 + v = 400 + 96.$$

$$v = 56\ \%. \quad \text{Ans.}$$

Carlo.—Let x and y be the rectangular components of a force P acting at O; if the point O is slightly displaced in any direction, show that the virtual work of P equals the sum of the virtual works of x and y.



ABC is a triangular lamina whose sides, AB and AC, are equal; it is placed within its circumscribing circle, whose plane is vertical; there is no friction, so that the triangle can move quite freely within the circle: find for what values of the vertical angle the triangle will come to rest with A below BC.

(S. and A. Department, 1898.)

If a force P change its point of application from O to O′, and O′C be drawn perpendicular to the line of action of the force, then the virtual work done by the force P is equal to P × OC.

This is true whatever may be the distance OO′, if the line of action of the force moves parallel to itself. In the above case this is only so when the point O is *slightly* displaced.

From O′ draw O′A perpendicular to Ox, and AB perpendicular to OP. Then

Virtual work of P = P × OC
= P(OB + BC)
= P(OA cos θ + O′A sin θ)
= P cos θ . OA + P sin θ . O′A
= x × OA + y × O′A
= sum of virtual works of x and y.

The forces acting on the triangle ABC may be reduced to two resultant forces:—

1. A force acting vertically downwards through the centre of gravity, G, equal to the weight of the triangle.

2. A force which is the resultant of the three reactions at A, B, and C.

This force always passes through O, since the reactions are along normals to the circle at A, B, and C.

Now two forces cannot be in equilibrium unless their lines of action are in one and the same straight line. The triangle can only be in stable equilibrium when G is vertically below O; in other words, G seeks its lowest level.

Imagine A to be fixed, and the angle BAC to become gradually less. Notice that the distance OG diminishes, and when G coincides with O the triangle is equilateral.

Hence, when the angle BAC is greater than 60°, A and G are on the same side of O; and when G comes to rest below O, A will come to rest below BC.

K. W.S.—AD and BD are lines in a horizontal plane at right angles to each other, and C is a point vertically over D. Let α and β be the angles of vertical elevation of C at A and B respectively. Show that $\cos^2 A \sec^2 \alpha + \cos^2 B \sec^2 \beta = 1$, where A and B are angles of the triangle ABC.

(Third Stage, S. and A., 1897.)

Draw a perspective figure. From C draw CP in the triangle BAC perpendicular to AB. Join PD. Satisfy yourself that you are dealing with six right-angled triangles—namely, ADC, BDC, PDC, ADB, APD, BPD. The angles α, β, A, B are the angles DAC, DBC, CAB, CBA respectively.

$$\cos^2 A \sec^2 \alpha + \cos^2 B \sec^2 \beta = \left(\frac{AP}{AC}\right)^2\left(\frac{AC}{AD}\right)^2 + \left(\frac{BP}{BC}\right)^2\left(\frac{BC}{BD}\right)^2$$
$$= \left(\frac{AP}{AD}\right)^2 + \left(\frac{BP}{BD}\right)^2$$
$$= \cos^2 BAD + \cos^2 ABD$$
$$= \left(\frac{AD}{AB}\right)^2 + \left(\frac{BD}{AB}\right)^2$$
$$= \frac{AD^2 + BD^2}{AB^2} = \frac{AB^2}{AB^2} = \underline{1}.$$

Dubious.—The decimal point is placed wrongly in the answer to your query given in the April number. The correct answer is ·033.

S. Ughtred Sharpe.—A boy can skate by himself a miles per hour, and if he drags other boys after him, his speed is diminished by a quantity which varies as the number of boys dragged after him. If his speed when dragging b boys is c, show that the greatest number of boys he can drag is the greatest integer in $\frac{ab}{a-c}$. (Coll. of Preceptors, First Class Algebra, Mids. 1898.)

Since the quantity by which his speed is diminished varies as the number of boys dragged, let it be equal to k × (number of boys), where k is a constant number, which can be found from the given data.

When he is dragging b boys, his speed will then be $(a - kb)$, which we are told is equal to c.

Hence $$a - kb = c.$$

$$\therefore k = \frac{a-c}{b}.$$

Now, when the quantity by which his speed is diminished is equal to a, he will be at a standstill. Let n be the number of boys in this case.

Then $$a - kn = 0.$$

$$\therefore n = \frac{a}{k} = \underline{\frac{ab}{a-c}}.$$

If with actual numbers for a, b, and c this worked out to be an integer, then the greatest number of boys he could drag would obviously be $\left(\frac{ab}{a-c} - 1\right)$.

If it worked out to be an integer plus a fraction, then the greatest number of whole boys would be the integer.

OUR SCIENCE SECTION

☛ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this Number.**

NOTES ON ADVANCED AND HONOURS PHYSIOGRAPHY.

The Twelfth Movement of the Earth.—M. Camille Flammarion, the talented French astronomer, gives in his *Annuaire Astronomique* a very interesting account of the twelve movements of the earth. "Our planet," says he, "we already knew to be the toy of no less than eleven movements, which are as follows: (1) Diurnal rotation in 23 hours 56 minutes; (2) annual revolution in 365¼ days; (3) precession of the equinoxes in 25,765 years; (4) the monthly movement of the earth round the common centre of gravity of the earth and the moon; (5) nutation caused by the attraction of the moon in 18½ years; (6) the secular variation in the obliquity of the ecliptic; (7) the secular variation in the eccentricity of the earth's orbit; (8) displacement of the line of apsides in 21,000 years; (9) perturbation due to the varying attraction of the planets; (10) displacement of the centre of gravity of the solar system, around which the earth yearly revolves, which centre is determined by the varying positions of the planets; (11) the movement of the solar system as a whole towards the constellation Hercules. A twelfth movement—namely, that of the terrestrial poles, from 15 to 17 metres per annum, in consequence of which there is a slight alteration in the latitudes of all countries—has been described, and is being further investigated by M. Albrecht." M. Flammarion gives an illustration showing the monthly variations in the position of the pole, due to this cause, from the 1st January 1890 to the middle of 1897. The variation is believed to be due to the movements of the atmosphere and of the sea.

Mammoth Ivory.—Of all fossil remains, none are so weirdly interesting as the complete undecayed carcases of the mammoth that from time to time are dug out of the frozen tundras of Siberia. "This remarkable state of preservation has been produced by entombment in the frozen soil of the tundras. In many instances entire carcases of the mammoth have been found buried with the hair, skin, and flesh as fresh as New Zealand sheep in the hold of a steamer. And sleigh-dogs, as well as the Yakuts themselves, have often made a hearty meal on mammoth flesh thousands of years old." Our extract is taken from a very interesting article in the March number of *Knowledge*, which deals with these interesting remains in charming fashion, showing that for the supply of ivory these remains must be allowed first place.

Cheap and Easy Spectrum Analysis.—In the issues of *Nature* for February 16 and 23, Professor Norman Lockyer gives two articles on spectrum analysis, which not only explain simply and clearly the chief terms in use in this department of knowledge, but also show how, for the small sum of sixpence, a practical acquaintance with the more important principles taught by the spectroscope may be obtained. We commend the articles to all teachers and students of physiography, and we quote the following paragraph in order to show how eminently readable and practical the articles are:—"For sixpence any of us may make for ourselves an instrument which will serve many of the purposes of demonstrating some of the marvellously fertile fields of knowledge which have recently been opened up to us. From an optician we can get a small prism for sixpence. Get a piece of wood from 20 to 10 inches long (the distance of distinct vision), 1 inch broad, and half an inch thick. On one end glue a cork 2 inches high; at the other end fasten, by melting the bottom, a stump of a wax candle of such a height that the dark cone above the wick is level with the top of the cork. Then glue the prism on the cork so that by looking sideways through the prism the coloured image or spectrum of the flame of the candle, placed at the other end of the piece of wood, may be seen. We get a band of colour, built up of an infinite number of images of the flame produced by the light rays of every colour. But so far the spectrum is impure, because the images overlap. We can get rid of this defect by replacing the candle by a needle. If we now allow the needle to reflect the light of the candle flame, taking care that the direct light from the candle does not fall upon the face of the prism, we then get a much purer band of colour, because now we have an innumerable multitude of images of the thin needle instead of the broad flame close together. The needle is the equivalent of the slit in the more complicated spectroscopes used in laboratories."

The Orbit of Witt's DQ.—Writing to *Nature*, Mr. Thos. W. Kingsmill makes some suggestive remarks on the subject of the tiny planet DQ or Eros:—"The extreme eccentricity of the orbit of Witt's planet suggests some interesting speculations. Assuming that the aphelion and perihelion distances in terms of the earth's distance are respectively 1·79 and 1·12, the planet approaches the sun in 322 days, a distance of 61 million miles—an average of 200,000 miles a day. Practically this may be considered a fall during the half revolution of this distance. Now, if the planet were a perfectly plastic body, and we knew all its elements, it would be perfectly possible to determine the deforming forces acting on it during the passage. It is evident that the force of gravity acting on the forward point of the syzygial axis would always be in excess of that on the rear, and in consequence that the tendency would be to continually lengthen that axis in a proportion referable to the squares of the distances fallen. On the other hand, the force of internal gravitation towards its own centre would always tend to restore the sphericity, and the result would be that a body starting as a sphere from aphelion would find the syzygial axis prolonged and its shape deformed into an increasingly prolate spheroid, till, on its arrival at perihelion and its commencement to retreat, the reverse phenomenon would occur, and the planet on its return become a sphere again. Now, of course, we have no reason to suspect that DQ is a plastic body; and the comparative insignificance of its size would, were it composed of matter of equal rigidity with ordinary rocks on the surface of the earth, enable it to successfully resist these deforming influences. We may, however, imagine a case where the strain would be sufficient to break up an ordinarily rigid body if the eccentricity exceeded a certain amount, and the consequent differential action of gravity became sufficiently great. A hypothetical planet moving in an orbit of high eccentricity—for instance, between Mars and Jupiter—might, so long as it remained plastic, preserve its condition as a single coherent body. If, however, it were cooled to an extent sufficient to become enveloped by a rigid crust, there might come a time when the deforming forces would cause deep and continually proceeding fractures. Eventually we can conceive that these fractures would split up the body into fragments, each of which, from its own intrinsic rigidity, would be able to maintain its shape and cohesion. In such a case each of the fragments would proceed to take up an independent motion of its own. Hence, perhaps, we may see our way, without calling in any extraneous factor, to **account for the present zone of asteroids**, as well as explain the small size of the individuals. This tallies, moreover, with observation. The great planets have all orbits approaching a circle. Jupiter, the greatest of all, has, with one exception, the smallest maximum of eccentricity; and Mercury, the smallest, has actually the greatest. The Leonides move in a still more elongated orbit, and they are amongst the smallest celestial objects with which we are acquainted. Altogether the smallness of the planet and the eccentricity of the orbit have some connection in fact; this connection cannot be fortuitous, and it seems not altogether presumptuous to refer it to a common law which we know pervades the universe."

Barium Sulphate as a Sandstone Cement.—Professor Clewes of Nottingham read before the Royal Society a paper

on the occurrence of this somewhat unusual cement, which was found in the sandstone of Brancote and Stapleford, near Nottingham, the grains of sandstone being enclosed by the sulphate. It is suggested by Professor Clewes that the barium sulphate was formed by the action of barium chloride upon calcium sulphate, but until recently this theory was difficult to accept, because no water of the vicinity was found to contain barium chloride. Now, however, at Ilkeston, water has been found containing a large proportion of barium chloride; and as this water comes from Brancote, the formation and deposition of barium sulphate as a cement is now easy of explanation. Since the discovery of Professor Clewes, Mr. C. C. Moore has also found rocks in which the cementing material is barium sulphate, the formation in which the discovery was made being the triassic sandstones of Prenton and Bidston.

CHEMISTRY NOTES.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honourman in Chemistry (Science and Art Department); Head-Master, Finchley School of Science, and Lecturer therein on Chemistry.

Suboxide of Phosphorus (P_4O).—This body, the discovery of which was made by Le Verrier, and which has hitherto been prepared either by burning phosphorus in a limited supply of air, or by exposing a solution of phosphorus in PCl_3 or PBr_3 to air and light, has recently been prepared by Messrs. Michaelis and Pitsch in a way altogether unexpected. Finely-divided phosphorus is treated with a weak solution of KHO or NaHO in alcohol. The liquid becomes of an intensely dark red colour, hydrogen in the meanwhile being slowly given off. The red solution is treated with acid, and yields a greenish-yellow precipitate, which on analysis is found to be pure suboxide of phosphorus. The remarkable thing about the reaction is that it should have escaped notice, remembering how often caustic hydroxides are treated with phosphorus in the preparation of PH_3.

The Boiling Point of Liquid Hydrogen.—Professor Dewar has been studying this question, which he has attempted to solve in three ways—namely, (1) by means of a platinum resistance thermometer; (2) by the employment of a platinum-rhodium resistance thermometer; and (3) by using a constant volume "air" thermometer containing hydrogen under diminished pressure. The results obtained are as follows:—(1) According to the platinum resistance thermometer, hydrogen boils at 35° absolute temperature; (2) according to the platinum-rhodium thermometer, the boiling point is 27° absolute; whilst (3) from the hydrogen thermometer a boiling point of 21° absolute was obtained. The determinations give a lower boiling point than was expected, and there is reason for believing that the rhodium-platinum alloy result is more nearly accurate than that obtained from pure platinum, and that the hydrogen thermometer result is the most reliable of the three.

A Delicate Reaction of Hydrogen Peroxide.—Advantage is taken by the author, Mr. Edgar S. Barrelet, of the well-known fact that solutions of H_2O_2 quickly oxidise the pale blue precipitate obtained on adding a solution of $K_4FeC_6N_6$ to a solution of a ferrous salt, the resulting body being the well-known Prussian blue. Owing to the high colorific value of this pigment, the reaction just described may be used as a delicate test for the presence of H_2O_2. An experiment performed by Mr. Barrelet was as follows:—Ten c.c. of H_2O_2 of a strength of about 3 per cent. were diluted to 100 c.c. with water. Ten c.c. of this solution were again diluted to 100 c.c. Twenty c.c. of this solution diluted with water to 1 litre gives a solution of H_2O_2 containing 0·2 per cent. of H_2O_2 of 3 per cent. strength, or approximately 1 part of H_2O_2 to 165,000 parts of water. Such a solution instantly intensifies the pale-blue colour of ferrous ferrocyanide, 1 c.c. in 20 c.c. of the freshly-precipitated compound being quite sufficient to make the reaction apparent. The ferrous ferrocyanide should either be freshly precipitated for each test, or be kept in a bottle under a layer of petroleum.

Preparation of Phosphorescent SrS.—The usual method of preparing SrS is by the reduction of the sulphate (celestine) with carbon, thus—

$$SrSO_4 + 2C_2 = SrS + 4CO.$$

The method under discussion makes use of the carbonate (strontianite) from which the sulphide is obtained by reaction with the vapour of sulphur. A long porcelain tube has two porcelain boats placed within it some distance apart. In one of these is sulphur in little pieces, whilst the other contains coarsely-powdered strontianite. The porcelain tube is placed in a combustion furnace, and the whole apparatus is filled with dry nitrogen before heating. The tube is now gradually heated, commencing with the end remote from the $SrCO_3$. The vapour of S is carried along the tube by the stream of nitrogen, and gradually transforms the whole of the strontianite into SrS. If pure $SrCO_3$ is used, the SrS is not phosphorescent. The phosphorescence of SrS from strontianite is probably due to the presence of manganese, which is found to be a constant impurity in strontianite. M. Maurier also shows that if the sulphur vapour acts upon the $SrCO_3$ at a dull red heat, the SrS is not phosphorescent; and finds, in addition, that there is a critical temperature above which sulphur vapour will always react in such manner as to form the phosphorescent sulphide.

Phosphorescence of Strontium Sulphide.—M. Mourelo has found that the sulphides of Sr, Ca, Ba, and Zn present a greater and more persistent phosphorescence after exposure to diffused daylight than to the direct rays of the sun for the same period. In fact, the yellowish-green luminosity characteristic of strontium sulphide is never properly obtained from specimens which have been exposed to direct sunlight. The reason is probably that the light waves of greatest amplitude exert the greatest influence, the exciting force in this case being in the invisible portion of the radiation. Radiation from the nearly colourless Bunsen flame, and from iron heated to a temperature lower than that of redness, is sufficient to produce phosphorescence. One portion of SrS whilst phosphorescing can excite phosphorescence in another in its neighbourhood.

Heat of Formation of Anhydrous Lime.—In a previous note we have referred to the preparation of pure crystallised calcium, and have also briefly dealt with the question which we are about to discuss more fully. Starting with this pure product, M. Moisson has estimated the heat of formation of anhydrous lime, his figures being very different from those obtained by Thomsen, whose inaccuracy is accounted for on the assumption of the impurity of the calcium used. The small crystals of calcium were placed in a cylindrical tube of platinum covered with a number of small openings of ·25 mm. diameter. When the cylinder is placed in the calorimeter, a very little water enters, and the liberated hydrogen prevents the too rapid ingress of the water. It was found that the gram of calcium was completely converted into hydroxide in three or four minutes. The calcium was weighed previously, and also estimated as lime in the water of the calorimeter,—

$$Ca + 2H_2O = H_2 + CaH_2O_2.$$

The mean of two determinations gave 94·1 as the heat of formation, from which the heat of formation of anhydrous lime is calculated as follows:—

$Ca + O = CaO$ (anhydrous)..... x cal.
$CaO + H_2O = CaH_2O_2$ (sat. sol.)..... +18·1 ,,
$H_2O = H_2 + O$..... −69 ,,
$Ca + 2H_2O = CaH_2O_2$ (sat. sol.)..... +94·1 ,,
$\therefore x + 18·1 - 69 = 94·1.$

From which it follows that $x = 145$ cal.

Thomson's determination gave $x = 131·5$ cal.

Aluminium as a Reducing Agent.—Herr Franck announces in the *Chemiker Zeitung* some very interesting results under this head:—

1. *With P* a phosphide is formed by heating powdered Al and the vapour of P in an atmosphere of H. The compound gives PH_3 in the presence of moist air. It is decomposed by water yielding a hydrate of aluminium and a brown residue. Acids and alkalis decompose it; but it is not decomposed upon heating in air.

Phosphoric Acids are all decomposed on heating by Al, more especially the metaphosphates, which react as follows:—

$$6NaPO_3 + 15Al = 6NaAlO_2 + 2Al_2O_3 + Al_3P_2 + P_2.$$

The same reactions occur with the calcium and magnesium salts.

2. *Carbon Compounds.*—When dry CO_2 is passed over powdered Al heated to redness, the reaction that follows is expressed by the following equation:—

$$3CO_2 + 4Al = 2Al_2O_3 + 3C.$$

The same results obtain with CO, thus:—

$$3CO + 2Al = Al_2O_3 + 3C.$$

Alkaline carbonates and aluminium in proportions corresponding to the following equation, when heated to redness, become incandescent amorphous carbon, and the free metal of the alkali being products of the reaction,—

$$Na_2CO_3 + 2Al = Al_2O_3 + C + Na.$$

In like manner, Herr Franck has isolated Li, K, Ca, Ba, and Sr.

Carbon itself forms a carbide when powdered Al is heated with lampblack; but the carbide cannot be separated from the excess of lampblack, and at present the pure carbide can only be prepared by means of the electric furnace.

3. *On Oxides.*—CuO and Al detonate violently when heated to redness. When the Al is in excess a bronze is obtained. Ag_2O behaves in the same way, and lime may be partly reduced by Al, and this process should enable us to prepare alloys of calcium, but this is doubtful. The same applies, but in different degrees, to Ba and Sr. Finally, Al reduces, more or less easily, the oxides of Zn, Cd, Hg, Pb, Bo, Si, P, As, Fe, Mn, Co, Ni, and Mo.

4. *On Sulphates and Chlorides.*—The mixture of Al with $BaSO_4$ or any other sulphate when heated detonates, and amongst the products of the reaction are finely-divided sulphur and sulphides. All the chlorides are reduced by Al.

5. *On NaO_2.*—The mixture of NaO_2 and Al detonates on heating, and on moistening with water it spontaneously inflames.

Precipitation of Gold by Charcoal.—Gold as chloride has long been precipitated in Australia by charcoal, which has probably led to the employment of charcoal in Victoria to precipitate gold from cyanide solutions. At a mill in Victoria 10,000 lbs. of charcoal contained in 198 tubs are in constant use to precipitate 700 oz. of gold per month, during which period about 8 cwt. of ash is melted with 16 cwt. of borax, the cost being 1s. 6d. per oz., which is much dearer than in the zinc or electrolytic precipitation of gold from the double cyanide of gold and potassium. The reaction is a very obscure one. It has been suggested that carbon monoxide plays an important part in the process, but this is a very far-fetched suggestion, since no explanation has been given as to where the CO comes from.

PRACTICAL MATHEMATICS.

On the six Monday evenings preceding Easter, lectures on the above subject were delivered at the Museum of Geology, Jermyn Street, to working-men by Professor John Perry, F.R.S., D.Sc., Royal College of Science, London.

Small pamphlets, published by the Science and Art Department, containing tables of logarithms, sines, cosines, tangents, radians, etc., and some useful constants, were distributed amongst the audience. These, we understand, may be had on application to the Department.

At the close of each lecture sets of questions were given to each member of the audience. From these we have made the following selection:—

1. Calculate the values of ab and $a \div b$ when (1) $a = 1323$, $b = 24{\cdot}32$; (2) $a = 17{\cdot}56$, $b = 143{\cdot}5$; (3) $a = 0{\cdot}5642$, $b = 0{\cdot}2471$.
Ans. (1) 32175, 54·4. (2) 2520, 0·1224. (3) 0·1394, 2·283.

2. Show that the following statements of the standard taken as the pressure of one atmosphere agree:—
14·70 lbs. per square inch; 2116·3 lbs. per square foot.
29·92 inches of mercury at 0° C.; 760 millimetres of mercury at 0° C.
1033 kilos per square metre; 33·9 feet of pure water at 0° C.; 33·04 feet of sea water at 0° C.

3. For a certain purpose it is necessary to measure two distances in inches, to multiply the numbers, and to extract the square root. Find the answer when the distances are 2·34 and 1·56 inches. Find the answers also when the distances are 2·33 and 1·55, 2·35 and 1·57, 2·35 and 1·55.
Ans. 1·9106, 1·9004, 1·9208, 1·9085.

If the student will suppose the method of measurement of the distances to be such that an error of ·01 of an inch was possible, he will see that only three figures, say, 1·91, ought to be given in the answer.

4. Calculate a^b when (1) $a = 20{\cdot}52$, $b = 2$; (2) $a = 1{\cdot}564$, $b = 1{\cdot}5$; (3) $a = 0{\cdot}5728$, $b = 3$; (4) $a = 60{\cdot}71$, $b = \frac{1}{4}$; (5) $a = 0{\cdot}2415$, $b = \frac{1}{5}$; (6) $a = 1{\cdot}671$, $b = 2$; (7) $a = {\cdot}5014$, $b = 3\frac{1}{2}$.
Ans. (1) 421·1. (2) 1·956. (3) 0·1879. (4) 3·930. (5) 0·6227. (6) 0·3581. (7) ·08919.

5. Find $4{\cdot}326 \times 0{\cdot}003457$ to four significant figures, leaving out all unnecessary figures in the work. Find $0{\cdot}01584 \div 2{\cdot}104$ to four significant figures. Also do these, using logarithms. Find $\log_e 7$. Calculate
$5^{2\cdot43}$, $3^{-0\cdot246}$, $\cdot042^{0\cdot476}$, $\sqrt[5]{246{\cdot}3}$, $(30{\cdot}01)^{\frac{2}{3}} \times (0{\cdot}02641)^{\frac{1}{3}}$.
Ans. 0·01495, 0·007529, 1·9459, 49·95, 0·7632, 0·2211, 3·008, 5·872.

6. If $m = (a^3 + 2a^2b + s^{-\cdot345})^{\frac{2}{3}} \div (a^2b^2)^5$, find m if $a = 0{\cdot}504$, $b = 0{\cdot}309$, $s = 1{\cdot}567$. Ans. $1{\cdot}453 \times 10^8$.

7. (*a*) Work out the values of $M = (sr^{-1} - r^{-s})/(s - 1)$ when $s = 0{\cdot}8$, and r has the values 1·333, 1·5, 2, 3, 5, 8, 12, 20.
(*b*) Write out the values of M in Exercise (*a*), if s is 1·2.
(*c*) Work out the values of $M = (1 + \log_e r)/r$, when r has the above values.
Exhibit the three sets of values in a table.

8. The correct formula to use in a certain practical investigation is—
$$y = 0{\cdot}75 + 2{\cdot}59x^2 + \sqrt{0{\cdot}5x^{-1}\sin 3x^2 + x\log_e x + 0{\cdot}3x^3} \quad \ldots \quad (1).$$
It was known that it would not be used for values of x less than ·5 or greater than 1. It was quite impossible to work with it mathematically, so the following, found by means of squared paper, was used to replace it:—
$$y = 0{\cdot}11 + 3{\cdot}833x \quad \ldots \quad \ldots \quad (2).$$
For various values of x, compare the values of y found from the two formulæ.

9. If $pv^{1\cdot13} = a$, find the value of a when $p = 100$ and $v = 1$. If v becomes 1·5, using the same value of a, find p.
Ans. 100, 63·24.
Repeat the above when $pv^{0\cdot9} = a$.

10. If $I \propto D^{2/3}v^3$, and if $I = 655$ when $D = 1720$ and $v = 10$—
(1) Find I when $D = 1500$ and $v = 13$. Ans. 1313.
(2) Find v if I is 800 and $D = 1300$. Ans. 11·38.

11. The weights, W, of similar objects are as the cubes of their like dimensions, l, and as the densities, w, of their materials. Two similar objects are in the linear proportions of 1 to 4·37, and their densities are as 2 to 1·74. The weight of the first is 20 lbs.; what is the weight of the second? Ans. 1452 lbs.

12. Find the amount of £255·75, increasing at 3½ per cent. per annum for 17 years.
What principal will become £930, at 4½ per cent., in 10½ years?

13. Plot statistics interesting to you. If you have no special interests, plot such things as the following, from *Whitaker's Almanac*:—
A certain insurance office gives assurance of £100 at death for the following yearly premiums (convert shillings and pence to decimals of a pound):—

Age of Insurer	21	25	30	35	40	45	50	55	60
Premium	£ s. d. 2 3 1	£ s. d. 2 6 6	£ s. d. 2 11 9	£ s. d. 2 18 2	£ s. d. 3 6 3	£ s. d. 3 16 4	£ s. d. 4 10 7	£ s. d. 5 13 8	£ s. d. 7 4 9

What is the premium for an insurer aged 33 years? Use squared paper.

14. Correct the following observations by drawing a simple curve among the plotted points: y was not observed when x was 170; what is its probable value?

x	80	100	150	190	250	300
y	·55	·78	·97	1·10	1·22	1·24

15. A 16 pint saucepan costs 87 pence.
A 10 ,, ,, ,, 68 ,,
A 2 ,, ,, ,, 28 ,,
Plot and say what the price of a 1¾ gallon and a 1 gallon saucepan ought to be.

16. The following are the areas, A square inches, of cross-section of a body at right angles to its straight axis x inches from one end. Find the volume, and the x of the centre of gravity.

A	0	75	145	162	173	171	178	195	182	147	95	0
x	0	12·3	42·6	82·3	122	172	234	257	297	325	347	362

17. Many equations like the following have to be solved. They are really simple equations. If
$$y^4 = 0{\cdot}8\frac{x^5 + y^5}{y}, \text{ find the value of } \frac{y}{x}.$$
Multiply by y and divide by x^5, and we find $\frac{y}{x} = 1{\cdot}319$.

18. If it is known that y depends upon x, according to the law
$$y = a + bx$$
where a and b are constants; and if y is 12 when x is 1, and if y is 15 when x is 5, find a and b. Find the value of y when x is 3.
Ans. $y = 10 + 2x$, so that y is 16 when x is 3.

The student ought to see, when he inserts the given values of x and y, that he has to find the two unknowns, a and b, by the well-known method used in simultaneous equations.

19. Plot $y = x^{-0.246}$. Plot $y = e^{1.4x}$.

20. Plot $y = 2 + 0{\cdot}75x$. Plot $y = 2 + 0{\cdot}5x$.
Plot $y = 1 + 0{\cdot}75x$. Plot $y = 1{\cdot}5 + 0{\cdot}5x$.

21. Find the law connecting x and y, and the probable errors in the observed values of x.

x	2	3	4·5	6	7	9	12	13
y	5·6	6·85	9·27	11·65	12·75	16·32	20·25	22·33

22. Solve the equation $4{\cdot}3x^{2{\cdot}36} - 5{\cdot}4e^{-0{\cdot}24} + 17x^{-3{\cdot}4} = 12$.

23. By plotting on squared paper, solve $x^2 - 5{\cdot}11x + 5{\cdot}709 = 0$.

24. Divide 10 into two parts, such that three times the square of one part, plus four times the square of the other, shall be a maximum.

25. Plot log x and log y in the following case, and get probable law connecting x and y.

x	1·73	2·24	2·89	4·08	5·63	6·80	8·42	12·40	16·30	19·00	24·30
y	320	411	491	671	903	1050	1270	1780	2250	2520	3180

26. Draw an angle of 35°. Find by measurement the sine, cosine, and tangent of the angle, and compare with the numbers in the tables. Calculate the number of radians.

Try if $\sin^2 35° + \cos^2 35° = 1$, if $\dfrac{\sin 35°}{\cos 35°} = \tan 35°$, if $\tan^2 35° + 1 = \sec^2 35°$.

27. The sine of an angle is 0·25; find its cosine and tangent. Find the angle by actual drawing. How many radians?
Ans. ·9683, ·2582, 14°·5, ·2528.

28. If PQA is 90° and A is 47°, and AP is 5·23 feet, find AQ and PQ. Ans. AQ = 3·567, PQ = 3·824.

29. A point is in latitude 25°. If the earth were a sphere of 3,960 miles radius, how far is the point from the axis? What is the length of the circumference of the circle, called a parallel of latitude, that passes through the point? What is the 360th part of this in length, and what is it called? What is the 360th part of a circle called a meridian? What is it called?
Ans. Dist. from axis 3,589 miles, circum. = 22,550 miles.
$\dfrac{\text{Circum.}}{360} = 62{\cdot}63$ miles. $\dfrac{\text{Meridian}}{360} = 69{\cdot}1$ miles.

30. A plane area of 35 square feet is inclined at 20° to the horizontal. Find its horizontal and vertical projections.
Ans. 32·89 sq. ft., 11·97 sq. ft.

31. Through what angle must a rail 10 feet long be bent to fit a curve of half a mile radius? Ans. 0·22 degrees.

32. A cast-iron spherical shell, outside diameter 12 inches, weighs 100 lbs. Find internal diameter. One cubic inch of cast iron weighs 0·26 lb. Vol. of sphere = ·5236 d^3.
Ans. 9·979 inches.

33. The x and y co-ordinates of a point in a plane are 3 and 4. Find r and θ, the polar co-ordinates. Ans. $r = 5$, $\theta = 53{\cdot}13°$.

34. For a point in space, if $r = 10$ inches, $\theta = 35°$, $\phi = 62°$, find x, y, z. Ans. 2·693, 5·064, 8·192.

NOTES ON THEORETICAL MECHANICS.

BY F. CASTLE, M.I.M.E.,

Royal College of Science; Lecturer on Mechanics, Geometry, etc., Morley College, London.

ADVANCED AND HONOURS STAGES.

Ex. 3. A hollow cone filled with water is held with its vertex downwards and axis vertical; the length of the axis is 12 feet, and the radius of the base is 5 feet: find the whole pressure on its surface. (1894.)

Solution:—

If r denote the radius, h the length of axis of cone, length of a slant side $= \sqrt{r^2 + h^2}$.

Area of curved surface $= \pi r \sqrt{r^2 + h^2}$.

The surface of the cone may be divided into elements in the form of triangles, the vertex of each being at B. Hence

$$\bar{z} = \frac{h}{3}.$$

$$\therefore \text{Total pressure} = \tfrac{1}{3} w \pi h r \sqrt{r^2 + h^2}.$$

In the Ex. $r = 5$, $h = 12$.

$$\therefore \sqrt{r^2 + h^2} = \sqrt{5^2 + 12^2} = 13.$$

Taking $w = 62{\cdot}5$ = weight of a cubic foot of water.

,, $\pi = \dfrac{22}{7}$.

$$\text{Total pressure} = \frac{62{\cdot}5 \times 22 \times 12 \times 5 \times 13}{3 \times 7} = \underline{51{,}070 \text{ lbs.}}$$

Ex. 4. A cube, whose specific gravity is 0·8, rests in a rectangular tank with a square bottom; an edge of the cube is 15 inches, and a side of the square is 16 inches; just enough water is poured in to float the cube: compare the volume of the water with that of the cube. (1897.)

Solution:—

Height of water in tank = ·8 × 15 = 12 inches.

Volume of water = $12(16^2 - 15^2) = 372$ cubic inches.

,, ,, cube = $15^3 = 3375$ cubic inches.

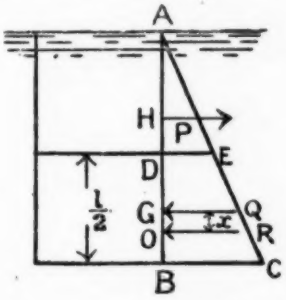
$$\frac{\text{Volume of water}}{\text{,, ,, cube}} = \frac{372}{3375} = \underline{{\cdot}1102}.$$

The centre of pressure may be found by an elementary application of the calculus, or in simpler cases it can be obtained by the most elementary methods.

Ex. 5. (*a*) A rectangle is immersed in water, with its plane vertical and one edge in the surface of the water: find the position of the centre of pressure.

(*b*) If a line is drawn across the rectangle, bisecting the two vertical sides, find the centre of pressure of the lower of the two parts. (1897.)

Solution:—This being a typical case, we will solve it by both methods. The triangle ABC (where BC to scale denotes the pressure at B) indicates the pressure on the rectangle. The centre of pressure of the rectangle is at a point $\frac{1}{3}$ BA measured from B. To find centre of pressure of the lower part, it is only



necessary to find the centre of gravity of the four-sided figure DBCE. To do this readily, we consider the resultant pressure P of the upper triangle ADE, and the resultant pressure Q of the whole rectangle: the former acting at H, where $DH = \frac{1}{3}$ DA; the latter at G, where $BG = \frac{1}{3}$ BA, denoting by l and b the length and width of the rectangle respectively.

Applying the rule for total pressure to find P and Q, we have

$$P = \frac{l}{2} \times b \times \frac{l}{4} = \frac{bl^2}{8} \quad . \quad . \quad . \quad . \quad (1)$$

$$Q = l \times b \times \frac{l}{2} = \frac{bl^2}{2}.$$

The resultant R is

$$Q - P = \frac{bl^2}{2} - \frac{bl^2}{8} = \frac{3\,bl^2}{8} \quad . \quad . \quad . \quad . \quad (2)$$

Let x denote distance of resultant from G.

The distance $\quad AH = \frac{2}{3} \times \frac{l}{2} = \frac{l}{3}$,

Hence distance $\quad HG = \frac{2}{3}l - \frac{l}{3} = \frac{l}{3}$.

Taking moments of P and R about G,

$$\therefore P \times \frac{l}{3} = R \times x.$$

Substituting values of P and R from (1) and (2),

$$\therefore \frac{bl^2}{8} \times \frac{l}{3} = \frac{3\,bl^2}{8} \times x,$$

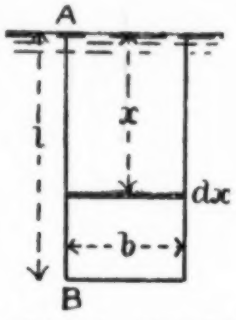
or

$$x = \frac{bl^3}{24} \div \frac{3\,bl^2}{8} = \frac{bl^3 \times 8}{24 \times 3\,bl^2} = \frac{l}{9}.$$

Hence the distance of the centre of pressure O from A

$$= \frac{2}{3}l + \frac{1}{9}l = \frac{7}{9}l.$$

By an elementary application of the calculus we may obtain the same result.



Let x denote the distance from the surface of an elementary strip dx.

Pressure at distance x $= wbxdx$

$$\therefore \bar{x} \times \frac{bl}{2} \times \frac{3}{4}lw = \int_{\frac{l}{2}}^{l} wbxdx.x$$

$$= wb\int_{\frac{l}{2}}^{l} x^2dx$$

$$= wb \times \frac{1}{3}\left(l^3 - \frac{l^3}{8}\right)$$

$$\therefore \bar{x} \times \frac{3l^2b}{8}w = \frac{7}{24}wbl^3$$

$$\therefore \bar{x} = \frac{7}{9}l.$$

HEAT.

WITH SPECIAL REFERENCE TO ELEMENTARY THERMODYNAMICS.

BY EDWIN EDSER, A.R.C.S., F.PH.S.

Experimental Determination of the Value of γ, the Ratio of the Specific Heats of a Gas.

The example worked out at the end of the last article will have made it clear that many problems in heat cannot be solved without introducing the quantity γ, the ratio of the specific heats of a gas. It may, therefore, be easily understood that the experimental determination of the value of this constant is a matter of some importance, and it is not surprising that accurate methods have been elaborated for this purpose. Two methods will here be described—namely, Clement and Desormes' direct determination, and the method of deducing the value of γ from the velocity of sound.

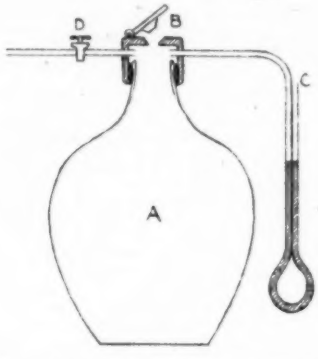
Clement and Desormes' Method.—A quantity of dry air is contained in a vessel A, Fig. 1. This vessel possesses a valve, B, communicating with the atmosphere, together with two side tubes communicating, the one with a manometer C, and the other through a tap, D, with a pump. The method of performing an experiment is as follows:—

1. The valve B is closed, and dry air is pumped into A till the manometer C registers a suitable pressure. This pressure should be equivalent to that of about 30 cms. of water. The stop-cock, D, is then closed, and the whole apparatus is left until the manometer registers a stationary pressure. From what has been said previously, it will be evident that in pumping air into A, work will be done, and the enclosed air will be heated. When the manometer registers a stationary pressure, the internal air will have reached the temperature of the surrounding atmosphere. The manometer is read, and the barometric pressure noted.

2. The valve B is now opened for a few instants and then closed. When the valve is opened the contained air expands into the surrounding atmosphere. If the apparatus is so designed that during the time the valve is open no appreciable amount of heat can be communicated from external sources to the air within the vessel, this expansion will be adiabatic. The expansion will end when the air remaining in A is at the same pressure as the surrounding atmosphere. The valve being closed, no air can subsequently leave or enter A.

3. At the instant when the valve is closed the liquid in the manometer will stand at the same level in both tubes. The air in A during the expansion has, however, become cooled; consequently, when the valve has been closed, and the air in A commences to absorb heat from the surrounding atmosphere, the manometer will indicate an increasing internal pressure. When no further change takes place in the relative heights of the liquid surfaces in the manometer, a reading of the difference in height between these surfaces is taken.

Fig 1



Theory of Experiment.—Let us suppose for a moment that the liquid used in the manometer is water; then it will be convenient to measure the three pressures which constitute the data obtained by this experiment in centimetres of water.

Thus, if P′ = barometric pressure in cm. of mercury,
P = " " " water.
P = 13·65 P′.

Let p_1 = the total pressure to which the air enclosed in A is subjected at the end of stage 1. Then p_1 = P + difference in level, in cm., of the water surfaces in the manometer, at the end of Stage 1.

Similarly, if p_2 = the pressure of the enclosed air at the end of Stage 3, p_2 = P + difference in level, in cm., of the water surfaces in the manometer, at the end of stage 3.

Let AB represent the isothermal of a certain quantity of dry air, at the absolute temperature, T, of the surrounding atmosphere, and let us suppose this quantity of air to remain throughout in the vessel A. Then if the volume of this air is v_1 at the end of Stage 1, its state is represented by the point C, Fig. 2, whose co-ordinates are p_1 and v_1. Consequently, we have

$$p_1v_1 = RT \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1).$$

During Stage 2 the air expands along the adiabatic CD till the pressure P of the atmosphere is reached. Let v_2 = the volume of the air at the instant when the valve is closed, and the state of the air is represented by the point D. Then, since both C and D lie on an adiabatic curve, we have

$$p_1v_1^{\gamma} = \text{constant} = Pv_2^{\gamma} \quad . \quad . \quad . \quad . \quad (2).$$

During Stage 3, since the valve is closed, the volume v_2 of this air remains constant. When the air contained by A has reached the temperature of the atmosphere, the state of the air which we are considering will be represented by a point on the isothermal AB corresponding to a volume v_2. This point, E, may obviously be found by producing the vertical line through D to cut the isothermal AB. The ordinate of E will obviously be equal to p_2, the pressure of the air at the end of the experiment.

Since C and E are on an isothermal, we have

$$p_1v_1 = p_2v_2 = RT \quad . \quad . \quad . \quad . \quad . \quad (3).$$

From (2),

$$\left(\frac{v_2}{v_1}\right)^{\gamma} = \frac{p_1}{P} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4).$$

From (3),

$$\frac{v_2}{v_1} = \frac{p_1}{p_2} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5).$$

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Substituting in (4) the value of $\frac{v_2}{v_1}$ given by (5), we have

$$\left(\frac{p_1}{p_2}\right)^{\gamma} = \frac{p_1}{P} \quad \ldots\ldots\ldots \quad (6).$$

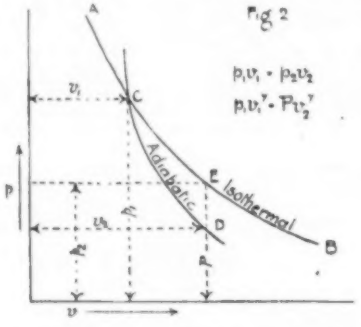
Taking logarithms to the base 10, of both sides of (6), we get

$$\gamma(\log p_1 - \log p_2) = \log p_1 - \log P.$$

$$\therefore \gamma = \frac{\log p_1 - \log P}{\log p_1 - \log p_2} \quad \ldots \quad (7).$$

In order to make the process more intelligible, the variations in pressure and volume which take place during the experiment are greatly exaggerated in Fig. 2. As a matter of fact, p_1, P_1, and

Fig 2



p_2 are all not far from equal. Thus, supposing the barometric pressure to be equal to 76 cm. of mercury, P = 13·6 × 76 = 1034 nearly. If the difference in level between the water surfaces was 30 cm. at the end of Stage 1, p_1 = 1064, which differs from P by only about 3 per cent.

Let us suppose that p_2 = 1043.

Then

$$\gamma = \frac{\log 1064 - \log 1034}{\log 1064 - \log 1043} = \frac{3{\cdot}0270 - 3{\cdot}0145}{3{\cdot}0270 - 3{\cdot}0182} = \frac{125}{88} = 1{\cdot}42.$$

Owing to the fact that the pressures entering into the above formulæ are all nearly equal, it follows that no great error will be committed if we write

$$\gamma = \frac{\log p_1 - \log P}{\log p_1 - \log p_2} = \frac{p_1 - P}{p_1 - p_2}.$$

Calculating γ according to the latter formula, we get

$$\gamma = \frac{1064 - 1034}{1064 - 1043} = \frac{30}{21} = 1{\cdot}43.$$

Experimental Precautions.—1. It is necessary that the air contained by A should not receive any appreciable amount of heat from external sources during the time that it is expanding. This condition is sometimes arrived at by carefully surrounding the vessel A with cotton-wool. Better results may, however, be obtained by simply making the vessel A as large as possible. For a given difference in temperature between the contained and the surrounding air, the amount of heat communicated in a given time will be proportional to the area of the exposed surface—that is, to the square of the linear dimensions of the vessel. The rise in temperature of the contained air, due to the addition of this heat, will be inversely proportional to the volume of the vessel—that is, to the cube of the dimensions. Hence, finally, the rise in temperature during the time that the valve is open will be proportional to

$$\frac{(\text{Dimensions})^2}{(\text{Dimensions})^3} = \frac{1}{\text{Dimensions}}.$$

Thus the larger the dimensions of the vessel are, the less will be the error due to this cause.

2. When the valve is opened, oscillations are produced in the air—that is, the air first expands till its pressure is lower than that of the surrounding atmosphere, and then air rushes back, increasing the pressure of the contained air, and so on. It is, therefore, best to keep the valve open for one or two seconds. In a piece of apparatus similar to that shown in Fig. 1, made from an ordinary carboy, I have found that no appreciable amount of heat is communicated to the contained gas during that interval.

3. The air must be dry. This can be ensured by pouring a little strong sulphuric acid into the bottom of the carboy. For the same reason, it is best to use some other liquid than water in the manometer. Mercury is too dense, necessitating a great internal pressure to produce the necessary difference in level of the surfaces in the manometer tubes. Sulphuric acid absorbs moisture rapidly from the atmosphere, so that the surfaces in the two tubes of the manometer stand at different levels when the pressure of the air inside the vessel is equal to that of the surrounding atmosphere. The liquid best adapted for use in the manometer is the oil used in the Fleuss pumps. This oil gives off no vapour even when exposed to very low pressures.

Questions.—1. The determination of γ by Clement and Desormes' method may be performed by first partially exhausting the vessel A, and then opening the valve B to allow the internal pressure to become equal to that of the surrounding atmosphere. Draw a diagram similar to Fig. 2, illustrating the processes which transpire in this case, and deduce a formula to determine γ. 2. If, in the example worked out in the text, the initial temperature of the air enclosed in A was 15° C., what was its temperature immediately after opening the valve?

Assume γ = 1·41 for air.

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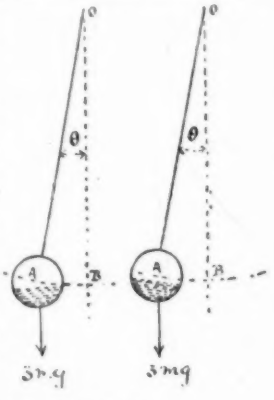
Student.—A thin spherical vessel of platinum contains water of twice its mass. It is fastened to a vertical wire, and oscillates about it. Compare the time of oscillation when the water is (1) frozen, (2) liquid.

(Assume water and ice to be of same density, and neglect all expansion and contraction.)

The wording of this problem is not very definite. Taking for granted that the water does not fill the spherical shell, it is impossible (on the assumption of a free surface of the contained liquid) to obtain a general solution; we must therefore make certain assumptions, taking for granted that the sphere is rigidly attached to fine, inextensible wire.



Let m = mass of spherical shell, $2m$ = mass of contained water, denoting by θ the inclination of the wire to the vertical when displaced from a position of rest.

Let l denote the length of the wire, and a denote the radius of the sphere, in the first case assuming that the oscillations are small, also that the surface of the water remains horizontal. Then the motion is simply harmonic motion (as in the case of a simple pendulum).

Force causing motion = $3mg \sin\theta$,

mass moved = $3m$.

$$\therefore \text{Acceleration} = \frac{3mg\sin\theta}{3m} = g\sin\theta.$$

$$\therefore \frac{\text{Acceleration}}{\text{Displacement}} = \frac{g\sin\theta}{(l+a)\theta}.$$

As the displacement is small, $\sin\theta = \theta$ approximately.

Hence $$\frac{g\sin\theta}{(l+a)\theta} = \frac{g}{(l+a)}.$$

But in simple harmonic motion $\frac{\text{acceleration}}{\text{displacement}} = \frac{2^2\pi^2}{t^2}$.

$$\therefore \frac{2^2\pi^2}{t^2} = \frac{g}{l+a}, \text{ or, } t = 2\pi\sqrt{\frac{l+a}{g}},$$

where t denotes the time of an oscillation.

In the second case, when the water is frozen, let c be the distance of the centre of gravity of *both sphere and ice* from the centre of the sphere. Then denoting by t^1 the time of an oscillation by a similar method to that used in the previous case, we obtain

$$t^1 = 2\pi\sqrt{\frac{l+a+c}{g}}.$$

Hence $$\frac{t^1}{t} = \frac{2\pi\sqrt{l+a+c}}{2\pi\sqrt{l+a}}$$

$$= \sqrt{\frac{l+a+c}{l+a}}.$$

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Third Class.—Daisy, Schguh, Woody, Aurora.

French Translation.

Voltaire was mischievous rather than ill-natured, undisciplined rather than turbulent, lax rather than corrupt. Amongst all the many caprices of his mind, audacities of his reason, and inequalities of his temper, he had some noble impulses: he loved glory, he could feel friendship, he abhorred injustice, and, in order to redress wrongs produced by violence and fanaticism, he has been known courageously to brave, and even to provoke, the wrath of violent men and of fanatics.

Let us be just to Voltaire: if there was an indelible stain on his life, if he had faults that can neither be forgotten nor extenuated, he had also some incontestable claims to consideration which do not permit us to abandon him without reserve to the reprisals of those whom he has conquered. Like the age in which he lived, in his war with the past he made use of unfair artifices, he gave way to bursts of rage, and he was ungrateful. He went further than he was justified in doing, but the ardour which he was not always able to restrain did not carry him beyond all bounds. In spite of his hatred of the Middle Ages, he paused respectfully before the noble presence of St. Louis; he extolled Henry the Fourth; he honoured Louis the Fourteenth even above his merits; he remained faithful to the literary religion of the previous century; he defended civilisation against the hypothetical innocence and purity of barbarism as imagined in the brain of Jean-Jacques; he rejected with disdain and anger the certificate of atheism conferred upon him by the Holbachs and Lamettries, and he did not allow himself to be disconcerted by the jeers of the Grimms and Diderots who reproached him, as if with a weakness, for still believing in his God, "the rewarding and avenging God."

In speaking of such a man, there is certainly a medium to be maintained between anathema and apotheosis. "POLLY."

The average merit of the translations sent in this month is hardly as high as usual. Many candidates seemed to lack that elementary acquaintance with the history of French literature which is necessary for the full comprehension of the extract set. This lack of preliminary knowledge produced a multitude of very curious renderings of passages the meaning of which should have been obvious. Hence very many failed to give a correct rendering of *les chimères d'innocence et de puretés barbares écloses du cerveau de Jean-Jacques*. The reference is here to the famous paradox of Rousseau, in which he maintained that the progress of the arts and sciences had been unfavourable to morality. Very many made *barbares* refer to *chimères*. The last sentence of the extract was rendered in a very curious manner by some competitors. One puts it, "We must not say he is either an anathema or a god;" and another, "He ought certainly to be placed between atheism and apotheosis." A striking example of the unintelligent use of a dictionary is afforded by the translation, "There is certainly a medium to keep between the ecclesiastical curse and the act of placing him among the gods."

German.

The prize is awarded to "C.E.M.," the pseudonym of Miss Montezambert, The Grove, Dunboyne, County Meath.

First Class.—Shakspere, Ulysses, Agaznog, Lucille, Civis Edinburgensis, Polly, Portia, Couperose, Schwalbenthaler, Pelican, M.F.C., S.A.M., Garnet, Godesberg, Consuelo, Quercus, G.C.M., E.S., A Mayflower.

Second Class.—Thundergay, Antonio, Azile, O Mimosa San (Portsoy), Set, Ladybird, Giuseppe, Käthe, Veritas, Holland, Nil desperandum (Richmond), Ickleford, Edelweiss.

German Translation.

Not a second did I waste of those precious weeks. Travelling is, in truth, delightful for its own sake. One shakes off the dust of everyday life, leaves things common and commonplace behind one, and goes in quest of new ones. How enchanting to start on one's travels at early dawn, when day is budding, and the freshness of youth seems to beckon one, with all its sunshine and treasures! The world is clad in bewitching radiance, and, surrounded by traces of the great and beautiful, we become ourselves fair and great. The past casts its awe upon us, and mighty forms of antiquity accompany us on our path. The world, like a panorama, appears to pass before the delighted eye of the spectator, who feels inclined to applaud, and call for the Manager who has set the scene. I have not yet arranged all the pictures in my head, where they are still occasionally jumbled together—Verona, Florence, Rome, and, fairest of all, the remembered image of Venice. C.E.M.

The piece presented no very special difficulties, and its leading ideas were, on the whole, very well rendered. The subjunctive in *als winke einem*, etc., caused a few errors. One competitor, following the construction, but not grasping the meaning, translated the whole sentence, "As if the first start in life, with its sun and its riches, gave one a friendly nod." *Mächtige Gestalten der Vorzeit schliessen sich uns an auf unserem Wege* embodies an idea which is not new; but the competitor who translated it as "Mighty forms of the *future* join us on our way," suggests a flight of fancy which has not yet, so far as we know, occurred to any author.

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THE EDITOR'S TABLE

RECENT GREEK AND LATIN BOOKS.

ADAM AND CHARLES BLACK.

The Conquest of Italy and the Struggle with Carthage, 753 to 200 B.C. By E. G. Wilkinson, M.A. This is the first of a series of three Latin readers, designed to form a continuous history of Rome. About two-thirds of the passages selected are adapted from Livy, and about one-seventh from Polybius. Extracts are also given from Dionysius, Plutarch, Valerius Maximus, and Aurelius Maximus. In length the passages given consist of about twenty or thirty lines, and have prefixed a brief introductory note, based on Mommsen, Niebuhr, Arnold, etc. At first only simple sentences are employed; afterwards some easy subordinate sentences are introduced. An interesting feature is the references made to parallel events in the history of other nations; for example, with Hannibal's crossing the Alps is compared Napoleon's in 1796. These parallels vary in value, but should be useful in the hands of a good teacher. The book is prefaced by a clear map of "Italy to illustrate the Tribal Divisions," and there are a number of notes, careful, interesting, and not too numerous. There is a complete vocabulary, and the text, which is clear and well-spaced, is illustrated by a number of drawings of Roman antiquities.

BLACKIE AND SON.

Latin Grammar Papers. Selected and arranged by A. C. Liddell, M.A. This is a good collection of Latin Grammar Papers, specially designed for middle forms in public schools, but likely to be very useful to private students. The first thirty-one papers are general papers on accidence. The next ten are taken from or modelled on recent Oxford and Cambridge Junior Local papers. Then follow six papers taken from or modelled on recent Oxford and Cambridge Junior Locals, and seven from the London Matriculation Examination. Finally, forty-two papers are mainly devoted to syntax. The last question in every paper will be found especially useful by the student. They contain some sentences for translation which either illustrate an idiom or comprise a simple catch. The index is designed to save the teacher's time by enabling him to set questions on some particular point (for example, *oratio obliqua*) without hunting through the papers. The type is clear and good, but the book does not open well—a point rather important for schools.

First Steps in Continuous Latin Prose. By W. C. Flamstead Walters, M.A. Mr. Walters has compiled a useful little book of exercises in Latin prose. The first part consists of short, well-chosen sentences on Latin order, English and Latin participles, the period, the treatment of abstracts and the subject; and for this there is a complete vocabulary. The second part consists of short stories, some of which are taken from the University Locals and other examinations, and short hints for translation are given at the end of each exercise. The type is legible, and the binding strong.

The Gallic War of C. Julius Cæsar, Book III. With Introduction, Notes, and Appendices by John Brown, B.A. This useful little edition of the third book of the Gallic War has a good introduction on ancient ships and Roman naval history. The text is clear, the lines in each section are numbered, and the notes are lucid and suitable for beginners. It can be used for elementary Latin prose; twenty-eight exercises follow the text, and there are Latin-English and English-Latin vocabularies.

Greek Unseens in Prose and Verse—Senior Section. Selected by E. Sharwood Smith, M.A. Of this little book of thirty-eight prose extracts and twenty-nine verse extracts it is sufficient to say that the Unseens are fairly representative and clearly printed.

Hints and Helps in Continuous Greek Prose. By W. C. Flamstead Walters, M.A. This useful little introduction to Greek prose contains a hundred well-chosen exercises. The hints given for composition are clear, and illustrated by plenty of examples. There is a good selection of metaphors, similes, and idioms, together with sections on the most characteristic particles, *oratio obliqua*, and a table of irregular verbs used in the book. Many of the pieces are from various examination papers, such as the University Locals.

WILLIAM BLACKWOOD AND SONS.

Latin Verse Unseens. Selected and arranged by G. Middleton, M.A. A hundred and eighty-five Latin Verse Unseens have been selected by Mr. Middleton from Ovid, Vergil, Horace, Martial, Lucan, and Lucretius. He has also chosen passages from Domitius Marsus, Silius Italicus, Phædrus, Valerius Flaccus, Propertius, Statius, Terence, Plautus, Persius, and less-known authors. Mr. Middleton, who is the Latin lecturer at Aberdeen University, has compiled the book mainly to meet the requirements of the different grades of the Scottish Leaving Certificate and University Preliminary Examinations. The later selections are harder, and designed for candidates for the Honours Certificate. The paper and type are excellent, and the binding neat and serviceable.

Latin Historical Unseens. By L. C. Vaughan Wilkes, M.A. This book contains about a hundred easy passages selected from standard Latin authors, and is specially designed for army classes. The Unseens are arranged in chronological order, and contain allusions to the most important events and characters in Roman history. The source should have been added to each excerpt, and a list of authors given. The historical notes are, on the whole, clear and well arranged. They are designed to elucidate the Latin passages, and supply to the student in a succinct form sufficient information to enable him to answer the short Roman history paper set by the Civil Service Commissioners at the entrance examination for Sandhurst, Woolwich, and the Militia.

Higher Latin Unseens. Compiled by H. W. Avden, M.A. Clearly printed and well got up, with an appendix pointing out points worthy of special notice in the passages, this little book will be found useful for higher forms and private students. Cruces and catchy passages have been avoided in this compilation, which is designed to aid pupils in acquiring a grasp of different authors.

Greek Verse Unseens. Selected and arranged by T. R. Mills, M.A. Like the companion volume to Mr. Middleton's *Latin Verse Unseens*, this selection of passages from the Greek poets for sight translation has been compiled chiefly to meet the requirements of the Scottish Leaving Certificate and University Preliminary Examination. Towards the end of the book there are more difficult passages, designed for candidates for the Honours Certificate.

CAMBRIDGE UNIVERSITY PRESS.

The Æneid of Vergil, Book I. Edited, with Introduction, Notes, and Vocabulary, by A. Sidgwick, M.A. **M. Tulli Ciceronis in Catalinam Oratio Prima.** Edited, with Introduction, Notes, and Vocabulary, by J. H. Flather, M.A. These two little volumes form part of the Cambridge Series for Schools and Training Colleges. The text is clear and well printed, and the notes good and careful. The introductions should be especially useful for beginners.

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Lives from Cornelius Nepos: Miltiades, Themistocles, Pausanias. Edited by John Barrow Allan, M.A. This is a very useful little first introduction to a Latin author, for though the accepted text has been altered in places to suit the needs of the beginner, no material alterations of any kind have been made. There are a historical introduction, with clear notes, and a Latin-English vocabulary. At the end of the book there are English exercises and an English-Latin vocabulary. The map to illustrate the text is clear, and there is a plan of the battle of Salamis.

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Homer: Iliad, Book XXIV. Edited by J. H. Haydon, M.A. The introduction deals with the Greek epics, editions, the Homeric question, the tale of Troy, a summary of the twenty-fourth book, the later date of composition, and the position of Troy. There is an appendix on metre and the Homeric dialect.

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A Complete Latin-English Vocabulary to Vergil's Æneid, Book IX. Edited by J. F. Davis, M.A. This is simply the last few pages of the preceding book stitched into a paper wrapper.

Ovid: Metamorphoses, Book XIV. Edited by the Rev. Ralph Harvey, M.A. (Lond.). The notes to this edition of Book XIV. of the *Metamorphoses* are full and careful; there is for introduction a life of Ovid, and at the end of the book there are an index of proper names and a vocabulary. There is also an index to the notes. It is a useful edition both for the private student and for schools.

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The First Oration of Cicero against Catalina. Edited by the Rev. G. H. Nall, M.A. This elementary edition of Cicero's first oration against Catalina is designed primarily for school use. The text adopted is that of Karl Halm, and the introduction and notes are based on those of Halm and Laubmann. It is a useful little edition for beginners, for whose use there is a complete vocabulary.

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Passages for Unseen Translation. Selected from Latin and Greek literature. By A. M. Cook, M.A., and E. C. Marchant, M.A. This book is intended mainly for public schools, and, in the first instance, for use at St. Paul's. The pieces are well chosen, and arranged in order of increasing difficulty. Prose and verse alternate throughout the book. At the end of the Latin excerpts there are given two or three samples of later Latinity chosen by Dr. Lupton, including a passage from More's *Utopia*, Erasmus's *Adagia*, and Milton's *Eleg. pr. ad. C. Diodatum*. There are excerpts from the Greek *Anthology*, and four Latin inscriptions. A careful index contains a list of authors, with dates and references to excerpts. It would have been better to make a separate index of Latin authors instead of printing them in italics.

Notes on Greek and Latin Syntax. By G. Buckland Green, M.A. This book is designed for the higher forms in schools, and will be useful to candidates for university and other public examinations. The treatment of Greek and Latin constructions has as far as possible been made parallel. A number of examples are given. They seem judiciously selected, but are not very numerous. There is an introduction, in which the chief rules for discussing and commenting on such constructions are given, and there is a fairly full index. The type is clear, and the book is neatly bound.

A Shorter Greek Primer. By A. M. M. Stedman, M.A. This is a very clear and well-arranged little book. The type and paper are excellent. The elements of Greek accidence and syntax are contained in a hundred and five passages. It is a very good little book for students beginning the study of Greek.

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A Shilling Arithmetic. By C. Pendlebury, M.A., and W. S. Beard, F.R.G.S. (Pp. x + 192.) This is a concise and admirable little book for "lower and middle forms of secondary schools. It will be found adapted especially for the use of candidates for the Oxford and Cambridge Junior Local Examinations, etc." It contains some 4,500 carefully graduated examples, and despite its size and price, the text contains full and exhaustive explanations of the rules involved. Section 37 should be rewritten. The use of = in this section is hopelessly confusing, and lands the authors in such a barbarous statement as

"6542 = 6 thousands 15 hundreds 14 tens 12 units" (!).

The authors have been endeavouring by adding ten units, ten tens, and ten hundreds to explain the theory of subtraction, but the result is very unfortunate.

We may add that the book is altogether different from the *Elementary Arithmetic* of the same authors, the range of which is not so extensive.

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The Coming of the Kilogram; or, The Battle of the Standards. By H. O. Arnold Foster. "The object and aim of the book," says the author, "is to make Englishmen realise the position in which they stand in the competition of the civilised world, and to show them exactly what they are risking by clinging to their present system of weights and measures while almost every other nation in the world is adopting another and a saner plan."

We need not, in the pages of this magazine, follow Mr. Arnold Foster in his argument. Every person whose opinion is worth a straw has long since made up his or her mind that our antiquated weights and measures, with their roods and rods, their ambiguous ounces, their firkins and kilderkins, should no longer be permitted to involve the wicked waste of five or six hundred hours of the life of every child, nor to scatter our foreign trade as they are doing, but must go the way of the old calendar, and enter upon the new style which the *Coming of the Kilogram* would introduce.

Yet, though we can follow Mr. Foster with enthusiasm to every one of his conclusions, we cannot consider his book altogether satisfactory. To begin with, it is terribly laboured and padded, and about half of it might fairly be omitted. Next, it is not quite fair to the old style. Bad as the old style is, it is not quite so bad as the examples of it on pages 114 and 115 would indicate. Macaulay's schoolboy would be dumb with astonishment if he had to face such monstrous pieces of arithmetic. It is required to multiply 24 tons 6 cwt. 3 qrs. 5 lbs. by 23, and to do this in such a way as to show the manifest superiority of the decimal system. Mr. Foster effects this by first reducing to lbs., then multiplying by 23, then again reducing back to tons, etc. An example of division is treated similarly on the next page. Mr. Foster explains: "They have been worked out at length to show what is the exact truth about the length of time and amount of trouble which are required in using other systems." The only thing which they do show is that Mr. Foster's knowledge of the compound rules is rusty, and, therefore, that the more the coming of the kilogram is hastened the better for Mr. Foster. As he pathetically remarks in another place, "Many more examples might be given to show that our British 'weights and measures are not easy to calculate with'" (page 51). The division sum on page 115 is badly chosen. It is easy to do the old-style sum mentally, and the new-style sum is actually, by accident, much harder to do correctly.

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The book should be cut down to half its size, and chapters should be added (1) on decimal coinage, and how the present system may be altered; (2) on the adjustment of prices. For ourselves, we should be glad to know how this last problem has worked out in Germany. We take, let us say, 3 pints of milk daily, and we pay 4½d. for it. I must either take 2 litres (that is, 3½ pints), which will be too much, or 1·5 litres, which will be too little. No doubt this delicate question could be solved by the household authorities, but what must I pay for it in "cents and mils"? What has been the German experience in similar problems? Has the gain all gone to the producer?

Beneath the Banner. By F. J. Cross. A collection of upwards of forty biographies of great and good men, women, and children. We have read this book with real pleasure, and extend to it the very heartiest of welcomes. It should be found in every elementary school where the English language is spoken, and should be used as an ordinary reader. Children love to read of noble lives and heroic deeds; and since the cultivation of character is being recognised as the very root of true education, such books as *Beneath the Banner* create the necessary stimulus, and unconsciously, as it were, lead to the formation of real nobility of character in our future citizens. Such books, indeed, help us to hand on the banner of incarnate love to our generations born and yet to be. We congratulate both author and publishers on the production of nearly three hundred pages of thoroughly excellent and readable matter—illustrated, too—for a shilling.

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The Tutorial Algebra, based on the Algebra of Radhakrishnan. By William Briggs, M.A., F.C.S., F.R.A.S., and G. H. Bryan, Sc.D., F.R.S. We have just noticed, with approval, *The Middle Algebra* of the same authors, so that we need say but little about this brilliant completion of the course. *The Middle Algebra* consists, in fact, of the first 354 pages of this book, omitting only—we scarcely see why—a chapter on Annuities. Then we have Complex Quantities (the geometrical interpretation of which is provided), Rational Functions, Graphs, Limiting Values, and elementary theory of Infinite Series, Binomial Theorem for Fractional and Negative Indices (Euler's proof is abandoned in favour of proofs depending on Van der Monde's theorem), Exponential and Logarithmic Series (here again the old and faulty proofs which depend on limits are abandoned), the Summation of Series, and the elementary theory of Determinant and Continued Fractions. The more we examine this work, the better pleased we are with it. Within its limits it is far and away the best book of its kind in the English language.

General Elementary Science. Edited by W. Briggs, M.A. Second Edition. The first edition of six thousand copies of this book having been exhausted within five months of publication, shows that the inclusion in the New London Matriculation Syllabus of general elementary science as a compulsory subject has created a want for an elementary work dealing with the subject, and this want has been met in a very able manner by this book. The elementary portions of the subjects of mechanics, heat, light, electricity, and chemistry are well and lucidly explained, and, where necessary, suitable experiments bearing on the subject-matter are indicated.

To ensure accuracy, the services of a number of well-known authors have been called in to contribute. These serve as a guarantee that the part of the work for which each is responsible has been ably done. The list of names of contributors is given in the preface. Exercises and a summary are given at the end of each chapter. These considerably enhance its value.

Tutorial Dynamics. By W. Briggs, M.A., and G. H. Bryan, D.Sc., F.R.S. Teachers and students are familiar with the excellent series of text-books by these writers, and an addition to the number will no doubt be very acceptable. The present work is virtually an enlargement of their *Elementary Text-Book on Dynamics*, arranged to meet the requirements of the dynamic portion of the Intermediate Science Examination of London. This will give a clear idea of the matter to be found in the three hundred pages comprised in the book, which is in many respects an admirable example of what a good text-book should be. It is clearly written, the arrangement is scientific and logical, and it is well illustrated.

Unfortunately some sections of the book, such as "Moment of Inertia," etc., are solved by so-called elementary mathematics, which involve the troublesome methods of forming a "series," and the final unsatisfactory result. The straightforward methods of using the merest elements of the calculus are not even indicated. These elementary notions of summation could be easily acquired by even a mere beginner in a short time, and they should at least find a place in a footnote.

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Psychology in the Schoolroom. By T. F. G. Dexter and A. H. Garlick. This is one of the most conscientious books it has ever been our lot to examine. The authors have read widely; no page has been left unturned which might in any way help them in their work. While they have an exasperating familiarity with the authorities on theoretical matters, they themselves are authorities on all that concerns the practice of their craft. Our main complaint, indeed, is that they do not sufficiently assert themselves. In these days of blatant self-assertion it is specially pleasant to have to take to task two authors for the unheard-of offence of thinking of themselves less highly than they ought to think. We do not object to a certain amount of modesty. It is perhaps allowable to describe their fourteenth chapter as "*an attempt to examine* the psychological basis of the kindergarten system;" yet we cannot but feel that such a successful chapter hardly deserves such a snub at the hands of its authors. But our main quarrel with the authors on this score lies in their use of great names. Very frequently they begin a subject with a definition duly vouched for by a big author; then they proceed to deal with the subject themselves, their treatment, however, only leading up to another big author whose definition closes the case, while our two writers look on with a sort of "didn't-I-tell-you-so" air. Men of the standing of our two authors should not treat the strangely-conflicting opinions of Sully, Bain, and Froebel as inspired. Further, it is misleading to affix names of greater or less magnitude to statements that are little more than the commonplaces of mental science. Our authors frequently err in this way, though the glaring example on page 99 can hardly be called typical. "*Comenius said*, 'There is nothing in the mind that is not first in the senses.'" As the authors very wisely declare, polemical matter should find no place in such a manual; and in point of fact nothing but generally-accepted doctrines need be introduced at all. Since they are dealing simply with what is the common property of psychology, our authors are perfectly entitled to use their facts without acknowledgment, and make the best use they can of them.

The practical application of psychological truth is always a most difficult affair, and we do not remember any case in which this application has been better made than in this book. Critics and others who clamour for *practical* applications will clamour no more after reading the four hundred odd pages we have just finished, particularly if they do not skip the numerous small-type paragraphs headed "Teacher's Work." It would almost appear that the book is too full and too well arranged. When we began the volume, we had a general impression that we knew the subject; when we laid it down, we were not quite so sure. It is not that there is anything in the book that we had not already known, but that the matter is so wonderfully chopped up and hedged in by letters of the alphabet and Arabic numerals that we are certain we could not pass an examination upon the book, though we might face an examination on the subject. No doubt, as the authors themselves say in a different connection (p. 351), "classification promotes clearness and economy;" but there is a danger in carrying classification to the extent we find it in this volume. The authors seem to aim at absolute completeness; they wish to include everything that can be said about everything. Their work, especially in the moral section, suggests nothing so much as the casuistical compilation of Escobar. One feels that the book is a book of reference, to be turned up in all possible cases of moral doubt. A little broader treatment, with a little more reliance upon the power of the reader to apply general principles, would probably have produced a more really useful book. For example, the distinction between mere sense training—which is impossible—and perceptual training should have been insisted upon. Besides, the real meaning of *training* itself gets no adequate treatment, perhaps because it cannot be portioned out among the letters of the alphabet. The student who gets a grip of the essentials of his subject will find that all the letters of the alphabet, and all the numerals to boot, will be added unto him.

What we deplore is that such a book as this should be necessary. But the nature of the present examinations in the subject is the authors' perfect justification. The book is admirably suited for students preparing for certain examinations. Even the most expert examiner will find it impossible to set any fair question out of which a candidate who has mastered this book will not be able to extract full marks. The analyses which are placed at the ends of the chapters are models of logical arrangement and coaching skill. No doubt the work is much too full of matter, but that only means that it must be used judiciously. A wise teacher will find the book a most valuable aid in preparing pupils for the various education examinations. He will be able to select the portions to which attention should be directed.

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The Art of Teaching. By David Salmon. Mr. Salmon here gives us a thoroughly workman-like book. The experienced teacher is indicated in almost every line of it, and no inexperienced teacher can read it without being vastly the better for it. The title fairly indicates the scope of the book, which is neither a treatise on applied psychology on the one hand, nor a manual of school management on the other. It is true that the author begins with Milton's definition of a complete and generous education, and proceeds to give a short chapter on "Some General Principles," but the whole spirit of the book is practical—intensely practical. Indeed, the reader cannot but feel that the author is less at home in the more abstract questions of the chapter on "Order, Attention, Discipline," than in the chapters which follow. In this chapter there are too many footnotes, which should either be incorporated with the text or omitted altogether. One must make broad statements in a short preliminary chapter like this, and little justificatory footnotes are out of place. This the author himself recognises when he makes the bold statement, "Young children have no moral sense," and leaves it to stand unpropped by any note. May we suggest, while we are speaking of the literary technique of the book, that the author would be well advised to cut out most of his parentheses?

The chapter on "Oral Questioning" is good throughout. Since our author is careful elsewhere to distinguish the accurate uses of terms, it would have been well that he should here have given a statement of the meaning of "guessing," and of the sense of the term in which it is a legitimate process on the part of the pupils. The appendix on the Socratic method is quite insufficient. Mr. Salmon has certainly avoided that overworked slave boy of the *Meno;* but while the selection he gives from the *Euthyphron* is a typical example of Socrates' method, it is not one from which a young teacher with only an elementary acquaintance with Greek life and thought will be likely to draw true conclusions as to the method. Mr. Salmon lays too much stress on the Socratic irony, to the neglect of the Socratic elenchus. Now the elenchus is the essential part of the method, and the irony is just that element which can be most easily dispensed with in school. What was essential in dealing with stiff-necked, argumentative Greeks is not at all necessary among children, who are only too prone to accept their teacher's word as final. After an eminently satisfactory chapter on object lessons, in which he calls attention to a very commonly overlooked point—the emphasis of a lesson, the rise and fall of the rhythm of a lesson, if we may be permitted to be figurative—our author proceeds to deal somewhat fully with the subjects of instruction in an ordinary elementary school. For this part of the work we have nothing but hearty praise. In "Reading," Mr. Salmon has not contented himself with the usual statement of the various methods. He gives reproductions of actual alphabets, and pages of reading books used in various systems. The anomalies of our spelling and pronunciation are admirably illustrated by series after series of lists, which not only illustrate the points under discussion, but will prove of great practical use to teachers engaged in the actual work of training the voice and the eye to work together. The chapter on "Writing" is equally well done. On this subject, in which every teacher is inclined to be dogmatic, it is difficult to say which style Mr. Salmon favours, so fair is he in stating the advantages and disadvantages of each. One paragraph in this chapter is of special value to young and indeed to old teachers; it deals not only with mistakes, but the causes of mistakes. That the same breadth of view characterises the chapter on "Arithmetic" may be inferred from the conclusions our author arrives at after an examination of the merits of the Grube method: "1. There ought to be *some* method of bridging over the interval between counting and formal rules. 2. The Grube method is infinitely better than none, though not better than any." Space fails us to go into the excellent chapters on "English," on "Geography," and on "History." "The Education of Infants" gets a final chapter of over forty pages. The treatment is largely historical, and so far it is admirable. Nowhere within the same compass can be had such a luminous presentation of the rise and development of infant schools. We are doubtful whether the portion devoted to "Froebel and the Kindergarten" will give satisfaction, in spite of its illustrations. But that is merely to say that one cannot in a few pages at the end of a book give a satisfactory account of a system which demands a book for itself; and for a brief account this final sketch is all that could be desired. One excellent general characteristic of Mr. Salmon's work is his invariable custom of giving an illustration of everything he treats of. He is not content, for example, to say that philological teaching is not literature teaching; he indicates a book in which pure literature teaching can be found. We have not yet verified his statement, but philological teaching is at present so rampant that we are grateful to Mr. Salmon for referring us to a sample of a better kind. We have ordered Mr. Herbert Bates's edition of the *Rime of the Ancient Mariner* (Longmans), and we may report on it by-and-by. Meanwhile we thank Mr. Salmon for a solid, interesting, and stimulating book. It may not be amiss to add, for those under the examiner's lash, that the book has an appendix of twenty-seven closely-printed pages of examination questions on the text.

The Differential and Integral Calculus and Differential Equations. By F. Glanville Taylor, M.A. (Pp. xxiv + 568.) This is a neatly printed, very accurate, and extremely cheap introduction to the subjects named. It contains within the compass of a single volume all that would be required by the ordinary student, presented in an attractive and eminently satisfactory manner. Numerous examples are provided at every step, many of which "are taken from the examination papers of the London University, the Science and Art Department, and Woolwich Academy." The answers to each set of examples are appended at the conclusion of the set—a novel arrangement for which there is much to be said. We rather regret that the author has "found it more convenient to separate the first two subjects than to take them together, as is frequently done." At the same time, it is only fair to add that the book is so arranged that the student may "read, say, the first six chapters (61 pp.) on differentiation, and then proceed to the first two chapters of the integral calculus."

The book is thoroughly up to date, and the few criticisms which have occurred to us in looking through it are all on minor matters concerning which there is room for divergence of opinion.

We object to the usage indicated by the footnote of p. 35, in virtue of which K is used to denote different things in the same paragraph; and have a similar objection to p. 340, where C in its life "plays many parts." For the advanced student there is no danger, but we believe that the solitary student will often be plagued by it, and that it would be better to write "mult." and "const." in each case.

The first two lines on p. 131 also need to be supplemented by a statement that an attempt to apply Maclaurin's theorem in such cases will generally lead to forms which cannot be dealt with until we come to p. 136.

We doubt the wisdom of encouraging the student to remember the results of the integration of $\frac{1}{a^2 - x^2}$ or $\frac{1}{x^2 - a^2}$, which can be almost instantaneously obtained when required.

We are inclined to think that a statement, at least, of Cayley's discovery of the reduction of all singularities to four primitive forms would be helpful, especially in dealing with rhamphoid cusps and the like.

We must not forget to note that the book is furnished with a complete and very satisfactory index.

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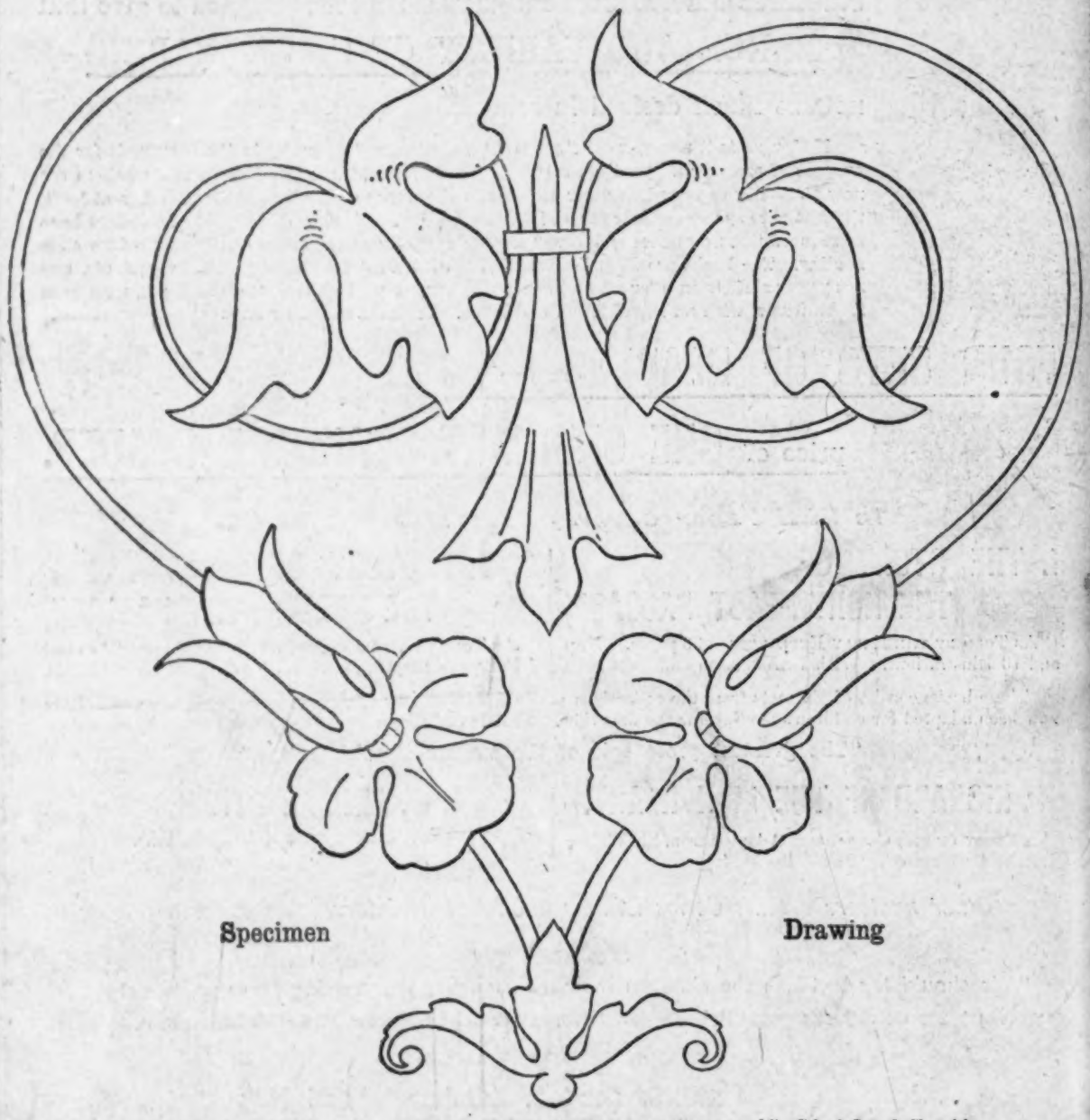

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